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DISCOVERY

A MONTHLY POPULAR JOURNAL OF KNOWLEDGE

EDITED BY EDWARD LIVEING, B.A.
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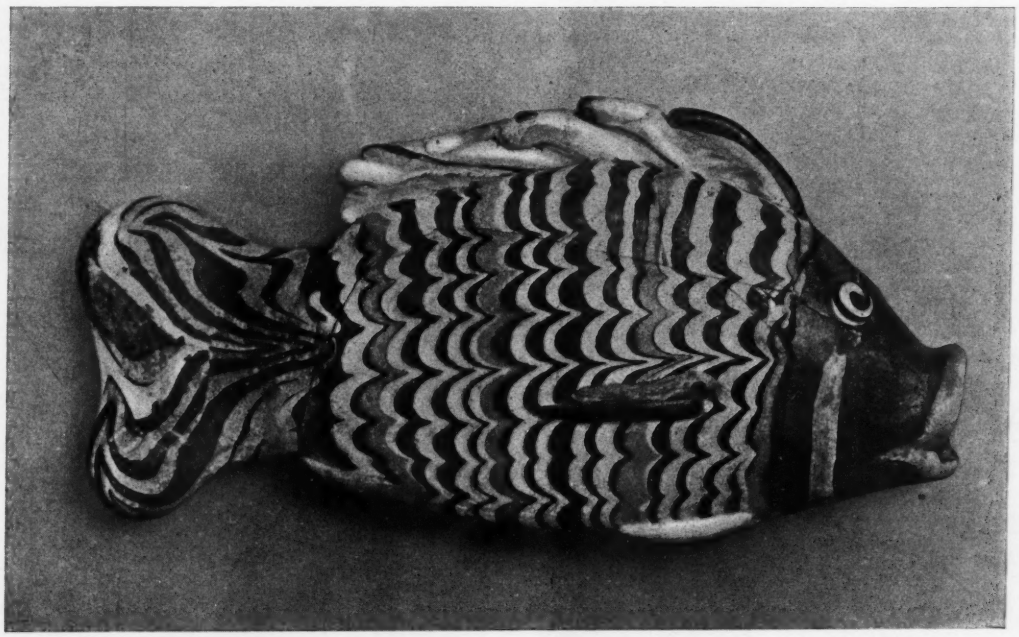

MADE OVER 3,000 YEARS AGO. A FISH-SHAPED GLASS BOTTLE FOUND IN THE RUINS OF THE CITY OF THE SUN-CULT AT TELL-EL-AMARNA

CONTENTS

	PAGE
EDITORIAL NOTES	249
THE CITY OF THE SUN-CULT Prof. T. E. Peet	252
NEW METHODS OF CRIMINAL INVESTIGATION George Frederic Lees	257
THE PROSCRIPTION OF 43 B.C. Prof. R. S. Conway	261
THE STUDY OF PLANKTON Dr. J. Travis Jenkins	265
STANDARDS OF CORRECTNESS IN ENGLISH (Concluded) Prof. Henry Cecil Wyld	267
REVIEWS OF BOOKS	271
BOOKS RECEIVED	275
MISCELLANEA	276

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DISCOVERY. A Monthly Popular Journal of Knowledge.

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Editorial Notes

THE speech of the President of the British Association at Edinburgh this year was quieter in tone than the usual presidential address. There was nothing about our coal or our supplies of wheat getting rapidly exhausted, or about the origin of life, or of continuity of life after death. This was rather hard on the daily press. The press likes the president to make sensational statements, so that when appropriately written up they may keep interest going for a few days at least. Yet the speech was a good one. Sir Edward Thorpe dealt with three main topics: the work of the department of Science and Industrial Research, the recent work on "isotopes" and the structure of the atom, and the relation of organised science to the prosecution of war.

* * * * *

Of the second of these topics little need be said here, for two or three articles upon it have already appeared in our columns; but a word or two on the manner in which this subject was reported in some of the London dailies may not be out of place. It was not well done. Some reporters treated it as entirely new work, carried out perhaps in secret during the last fortnight of August and whispered into the president's ear as he wrote his speech, and in many papers the description of the work even by *Our Special Correspondent* was not informed. Now the nation's attitude towards science and scientific research is of great importance with regard to its position and continued existence, and the daily press, if it chose to take a little more trouble, could do yeoman service in the creation of the right attitude. Any kind of accuracy on scientific matters will not do, but the press does not realise this. If a contributor were to declare that Consols are to be redeemed at par a week next Friday, that by insisting on laying ten to one on every horse that ran in a race a backer would speedily make a fortune, his editor would speedily tell him to desist, yet mistakes on scientific matters as glaring as these occur in papers accurate enough on finance and sport. And the advancement of science is of greater importance than finance or horse-racing.

* * * * *

With regard to the third topic of the president's speech, the relation of organised science to war, the speaker opened up many interesting problems. One of these, which will keep many people busily arguing, is, "Was the war due in some measure at least to the possession by the warring nations of the deadly weapons which the discoveries of science have produced? In other words, is not science a curse? Or was the war due to the fact that progress along moral and ethical lines had failed to keep pace with man's increasing mastery over nature, to the fact not of man's inheritance, but of his failure to be worthy of it?"

* * * * *

An interesting problem in conduct also arises. Should a research worker, whose views of war are those of Sherman, consent to undertake scientific work which he feels sure will be utilised in what cynics and others call the next war? Should a chemist, for example, consent to experiment with new forms of poison gas? It is often argued that very well he might, for, if war be inevitable, poison gas is far less fatal and far less cruel than any other instrument in finishing the "inevitable" war in the shortest possible time. For it has been

stated, and it appears to be true, that "amongst the 'mustard gas' casualties in the war the deaths were less than 2 per cent., and, when death did not ensue, complete ultimate recovery generally resulted. Other materials of chemical warfare in use at the Armistice do not kill at all; they produce casualties which, after six weeks in hospital, are discharged practically without permanent hurt." Yet after reviewing the matter Sir Edward Thorpe expressed very plainly his opinion not only of the poison-gas matter, but of the broader problem, the opinion it is hoped of every decent-minded man and woman in the country: "An educated public opinion will refuse to give credit to any body of scientific men who employ their talents in devising means to develop and perpetuate a mode of warfare which is abhorrent to the higher instincts of humanity . . . and will set its face against the continued degradation of science in augmenting the horrors of war."

* * * * *

The meeting of the British Association this year was further interesting because of the wide appeal that it made to many who have not previously been touched by its meetings. It has not been easy in the past for the organisers to know what line they should take—whether to make the meetings popular, that is, attract the public and impress the nation, or confine them to specialists in order that scientific workers, students, schoolmasters, schoolmistresses, and others, who cannot run up to London during the working year every time something is "on" at one of the learned societies, might learn at first-hand what the research folk have been doing in the past year. But, as the Association has now thirteen sections, and as many of these hold concurrent meetings, it was found possible to arrange that both classes of the public were adequately considered. Subjects like those dealt with in Professor Richardson's address on "Problems of Physics," or in Professor Lloyd Morgan's on "Conscious and the Unconscious," and in the presidential addresses to the sections of Chemistry and Botany, were quite clearly of interest to specialists only; but Sir Henry Hadow's lecture on "The Place of Music in a Liberal Education," or Mr. Hichens' on "The Principles by which Wages are Determined," or Dr. Hogarth's on the "Application of Geography," and the presidential addresses to the sections of Geology and Agriculture, were, by the nature of their subjects or treatment, of great general interest.

* * * * *

A feature this year was the number of joint discussions. A short list of some of these subjects was given in the Editorial Notes last month. It is admittedly a good thing to get specialists in mathematics, physics and engineering, or in zoology, botany, and physiology, or in geology and anthropology, to discuss together some general question which is studied in common. Science is now so detailed (we tremble for those who will study physics, chemistry or psychology fifty years hence) that no one can be "inside" more than one of its branches. If then a problem is on the border-line, a worker in one science must look for help from one in the sister science. This interchange of views on a subject is, therefore, valuable, and not only, it is found, merely in the acquisition of information, but also in enhancing the subject's interest.

* * * * *

The new science of psychology in which the public interest is so great has now a section of its own, (it was formerly a sub-section of physiology), and some of the most interesting papers of the meeting were read in this section. These varied over a wide field, for the psychologists do not believe in maintaining a narrow front. Dr. W. Brown opened a discussion on the relation of suggestion to psycho-analysis, a relation important from a theoretical point of view no less than from the practical. Freud himself has admitted that the factor of transference, (of which suggestion is a form), is essential in any course of psycho-analysis that is to lead to a cure or amelioration of the patient's condition, and this position was taken as the starting-point of discussion. Dr. C. W. Kimmins described an investigation which he had made into the sense of humour in school children. He has analysed a large number of jokes and funny stories recorded by children of different ages, and found out the elements which produce laughter and amusement at different ages, and the variation in this respect between boys and girls. The greatest changes in these elements he finds are associated with periods of rapid growth. He finds there are certain types of funny stories and humorous incidents that have a universal appeal, and he has worked out a reason for their survival even after a long life. It is hoped that this paper will be printed in an accessible place, not only because of its own interest, but also for the use that may be made of it by those who look after children.

* * * * *

In the Anthropology Section Mr. Miles Burkitt, whose book on *Prehistory* has been recently published by the Cambridge University Press, read a paper on a recent discovery of importance in Upper Palæolithic Cave Art. It is a good many years now since the discovery of the first Palæolithic Cave painting, and archæologists feel fairly sure that these extremely well-drawn engravings and paintings were made for magical purposes to obtain a good catch of game for these early hunters who, it is thought, knew nothing of metal, of agriculture, or of domesticated animals. A frieze of engraved animals (comprising horse, bison,

lion, reindeer in many attitudes, bear, rhinoceros and mammoth) has recently been discovered in a cave in the Pyrenees, surmounted by the dominating figure of a masked man, wearing a stag's antler on his head and a tail. Was this merely the usual sorcerer of the cave, asked Mr. Burkitt, or does it represent a primitive but ingenious method of catching stag? Now a certain very early Gallic god was always shown masked as a stag, and a Cretan god of Minoan times also, and the question is now raised as to whether there is any cultural connection between these representations of masking as stags.

* * * * *

The subjects of discussion were legion—the amount of information imparted very great. And next year they will be at it again! But the British Association is something more than a disseminator of scientific knowledge. It is a witness to the spirit of science, and an earnest advocate of the need for the adoption of that spirit by the commonwealth. It seems quite clear that scientific knowledge is going to transform the world *if* it be acted upon, and *if* men will make themselves worthy of the gifts that this knowledge has already brought and is still to bring them. In the degree that the general public realise this and support the work, to that degree the work goes forward and the public benefits. It is a pity that even now many people regard scientific workers as a curious group of old gentlemen with their heads metaphorically in the clouds. But it is they who remove mountains. The "tame scientists" the clever illustrated weekly calls them, overlooking the fact that it is " tame scientists " who have made it possible for the weekly to appear at all. Scientific work is a service of public utility. The knowledge derived from it can help in every department of life. If the last ton of coal or the last drop of oil has been burned, it can suggest another way of producing energy. If ten homes in a side street are served each day by four milk-carts, three bakers' carts, three grocers' carts and two butchers' carts and a few errand boys on bicycles—well, it can make certain suggestions for improvement there too. Science does not solve all life's difficulties, but it is a mighty and willing helper if we care to co-operate with it.

* * * * *

An interesting development in modern spoken English is traced by Professor Wyld in his article, " Standards of Correctness in English," the conclusion of which we publish in this number. This is a tendency that has affected our speech, as he shows, since the days of the eighteenth century—a change largely due to the standardisation of spelling in school and dictionary. The fact is that we are accustoming ourselves more and more to pronounce our words according to the way in which we spell them. Such a tendency is particularly noticeable amongst many of our American cousins, who are apt to pause on each separate syllable of a word, according to its spelling. But, perhaps, the alteration in the spoken language is most striking in the English countryside, where you can often hear grandfather speaking in the local dialect, and his ex-soldier grandson using a cosmopolitan speech developed at the village school and in the Army, and largely influenced by the written word.

* * * * *

Professor Wyld is a well-known authority on the study of the English language. He graduated at Oxford, but he also studied at two German universities, Bonn and Heidelberg, both conspicuous in the world of etymology. He held a Special Inspectorship of the Teaching of Phonetics in the Training Colleges of Scotland, the Baines Professorship in English Language at Liverpool University, and was last year appointed to the Merton Professorship of English at Oxford. Besides contributing to the study of popular dialects, he is well known for his various works on phonetics, a subject of whose claims he has been a strong advocate, especially as a part of the training of teachers. Few modern books or notes on the English language are written without some reference to his two standard works, *The Historical Study of the Mother Tongue,* and *A Short History of English.* His latest book on phonetics[1] *A History of Modern Colloquial English,* has been welcomed as an original treatment of its subject.

* * * * *

Our first sensations of horror at the disaster to the ZR2 have already been modified by the course of time. The loss of that gallant band of experts who met their death in the catastrophe is a new and grievous part of the price which mankind has paid in its continual struggle to master the powers of nature. We do not wish to appear callous, but we sincerely hope that the sudden end of the ZR2 will not affect the schemes of imperial transport which the new Air Ministry is trying to foster. There can be no doubt that lighter-than-air machines will eventually become the *goods-trains* of the air. Their greater wind-resistance may never allow them to develop the speed of the aeroplane, but we have already seen that they can outdo the latter in weight-lifting capacity and length of cruising range. Their safety should be greatly increased by a more general use of helium gas for inflating the envelope. It is far less inflammable than any other gas so far put to this purpose, but its cost of production is, unfortunately, very high. We hope that a more economical process of producing this gas will be discovered.

[1] Published by T. Fisher Unwin, 1920, 21*s*.

The City of the Sun-Cult

An Account of the Recent Excavations at Tell-el-Amarna

By T. E. Peet, M.A.

Professor of Egyptology in the University of Liverpool

To the student of Egyptian history Tell-el-Amarna is something more than a mere place-name. It is connected with what is perhaps the most striking event in the life of Ancient Egypt, the so-called heresy of Akhenaton. Any exploration undertaken on this site has a very definite purpose, namely the clearing up of the history of this little-known and supremely interesting episode, and it would be useless to describe the excavations which have been made there without giving the reader some general account of Akhenaton and his religious revolution.

First, however, a word regarding Tell-el-Amarna itself. The name is a solecism, for which the archæologist is to blame. The mounds to which the name is given, and which cover the remains of Akhenaton's city, lie near a modern Arab village called Et-Till, on the east bank of the Nile some 200 miles above (i.e. south of) Cairo. The district in which Et-Till lies is inhabited by a formerly nomadic tribe named the Beni Amran, from whom it takes the name of El-Amarna. Thus the village may for purposes of closer definition be called Till-el-Amarna, that is, Till of the Amarna district. The blunder was made when Wilkinson, as early as 1835, mistook Till for the word *tell*, which means a mound or hill, and put into currency the compound Tell-el-Amarna, which is now too firmly established to be suppressed.

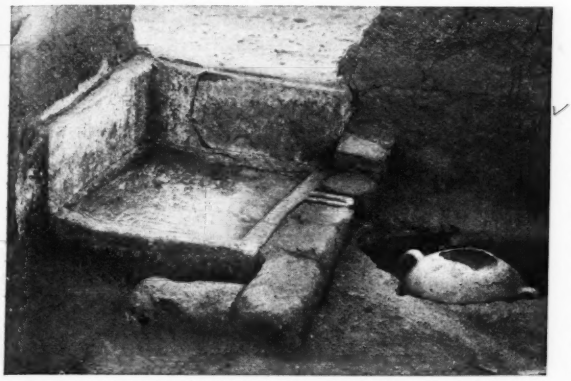
The XVIIIth Dynasty, which began about 1587 B.C.,[1] had witnessed the widest expansion of Egyptian power. The kings of the XIIth Dynasty (2000 to 1788 B.C.) had conquered Nubia, and even on occasion brought back great booty from Syria-Palestine, but they had, so far as we know at present, attempted nothing like a policy of conquest in nearer Asia. In the dark years which followed the fall of this dynasty, Egypt had been herself invaded by Asiatics, the hated Hyksos. After the expulsion of these intruders by the first kings of the XVIIIth Dynasty, she again rose to prosperity, and a period of reprisals against the Asiatics followed almost as a matter of course. There is not space here to describe the details of the wars which ensued; suffice it to say that by the time of Thothmes III (1501 to 1447) the Egyptians had conquered the whole of Palestine and Syria as far north as the Lebanon, and had even struck off to the north-east through the country known to them as Naharin and reached the Euphrates. Under Amenhotep III this empire was maintained, and his son, Amenhotep IV, afterwards called Akhenaton, inherited it unimpaired. There were, however, heavy clouds on the political horizon, for at the very moment of his accession the Hittites, whose empire lay in Central and Eastern Asia Minor, were threatening Syria from the north, while a people called the Khabiri (by some identified with the Hebrews) were drifting across the Jordan into Palestine in ever-increasing numbers.

Amenhotep III died about 1375 B.C., leaving a widow, Queen Ti, and a young son, Amenhotep, to succeed him. The internal situation in Egypt at this moment seems to have been perfectly normal. The court resided at Thebes, the modern Luxor, 450 miles above Cairo, as it had done since the beginning of the XIIth Dynasty, six hundred years before. The state religion consisted mainly in the worship of the god Amon-Ra, who, as the name implies, was a syncretism of the Sun-god Ra, one of the most ancient of deities in Egypt, with Amon, the local god of Thebes. This combination was both old and stable, and had been made in the usual easy Egyptian manner at the time when an obscure Theban family rose to power and conquered the whole of Egypt, conciliating religious prejudices and differences by uniting its own city-god Amon with the old state-god Ra. Side by side with the state worship of Amon-Ra there coexisted that of an almost innumerable pantheon of other deities, some local, some general, all with their priesthoods and adherents.

Such, then, was the state of affairs in 1375 B.C. But an astounding change was at hand. Not later than the sixth year of his reign, possibly as early as the fourth, the young king had moved his court from Thebes to Tell-el-Amarna, suppressed the time-honoured pantheon of Egyptian deities, and established a monotheistic worship of the Sun's Disk, or Aton, as it was called in Egyptian. Workmen were sent throughout the land to chisel out the name of Amon, and often those of the other gods too, in the monumental inscriptions of temple and tomb; the temples of Thebes stood empty, and shorn of their revenues, and all the most skilful men in Egyptian art and craft were

[1] The dates of the Egyptian Dynasties are determined astronomically, the calculation being based on the fact that the Egyptians, though they had a year of 365 days, failed to provide a Leap Year, and so got out of time with the Solar Year and its seasons to the extent of a day in every four years. Thus, if an inscription tells us that in a certain year of a certain king the beginning of the true or Solar Year fell on the 23rd of the third month of the Calendar Year, we can at once fix the date of that year, since we happen to know from ancient writers the dates (recurring every 1,460 years) at which the Egyptian Solar and Calendar Years began on the same day.

assembled in Tell-el-Amarna, building and adorning the vast temple of the Disk. Here the king founded his new city, Akhetaton (*Brightness of the Disk*), in a place "which belonged to no god and to no goddess, to no



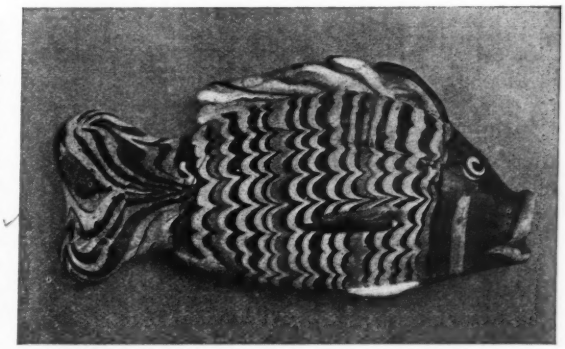
BATH MADE OF LIMESTONE SLABS, WITH VASE FOR REMOVING THE WATER.
(*Reproduced by courtesy of the Egypt Exploration Society.*)

prince and to no princess," at the same time changing his name from Amenhotep ("*Amon is satisfied*"), to Akhenaton ("*The Disk is pleased*").

It will at once be observed that the new religion has a point of contact with the old, for the new god is, like the old, a Sun-god. To this extent the new creed cannot rightly be called, as it often is, a heresy. But the presentation of the god was entirely altered. He was now represented, not in the old form of a hawk-headed man with the sun's disk on his head, an image born of a very ancient syncretism of Ra with the hawk-deity Horus, but under the form of a disk overhead, from which shoot down earthward numerous rays, terminating in hands offering symbols of life to the worshipper.

A large crop of problems has naturally sprung from the scanty account which has come down to us of this revolution. Here we must do little more than state them, hinting at the conclusions which on our present evidence appear most probable. Thus we are told by the anatomists who have examined Akhenaton's mummy, found not many years ago in the tomb of his mother, Ti, at Thebes, that the king cannot have been more than thirty years of age at death, and was very probably several years younger. As we know him to have reigned at least [1] seventeen years, this gives him a maximum of thirteen years at his accession, and of nineteen years at the moment of the revolution. Can a boy of nineteen have conceived and carried out so huge a scheme, or was there someone else behind it, possibly his mother, Ti? Having regard to the greater precocity of youth in the East, it seems by no means impossible that the king should have been himself responsible both for the conception and for the working out. Ti had probably little to do with it, and there seems some reason for believing that she remained at Thebes. Attempts to trace the origin of the heresy, through Ti and her supposed Asiatic parentage, to Syria are ill-advised, for the discovery a few years back of the mummies of Ti's parents in their untouched tomb at Thebes shows them to have been both of perfectly normal Egyptian type. On the other hand, recent discoveries have shown that the Disk, or Aton, had already a temple at Karnak under Amenhotep III, in which, though he was not as yet represented under the new form, he already bore the new and complicated name, formerly believed to have been given to him by Akhenaton, "Horus-of-the-Horizon, who rejoices in the horizon, in his name of Brilliance which is in the Disk."

An equally difficult question is this: Was the heresy a purely political move, initiated by Akhenaton in order to escape from the ever-increasing power and intrigue of the priesthood of Amon-Ra; or was it in truth a new philosophy with an improved ethical code, which the king felt himself called upon to preach to his people? Probably the truth lies in a combination of these two views. We do know that the priesthood of the Amon-Ra, into whose coffers the booty of almost annual victorious campaigns in Asia was poured, was already a menace to the throne which it eventually overthrew and usurped. On the other hand, no one who has read the wonderful *Hymn to the Disk*, probably composed by the king himself, one of the most remarkable documents in the early literature of the world, can doubt that the words are those of a man inspired by and



BOTTLE OF VARIEGATED GLASS IN THE FORM OF A FISH.
(*Reproduced by courtesy of the Egypt Exploration Society.*)

convinced of the beauty and importance of his mission. Attempts have been made to deny him the credit of having reduced polytheism to monotheism, but there

[1] The wine jars from the royal stores at Akhetaton were inscribed with the year of the king's reign in which they were laid down. They run in an unbroken series up to year 17.

is not much to be said in their favour. The man who was wise enough to write the *Hymn to the Disk* was probably also wise enough to see that some temporary concessions to popular belief were not only advisable but necessary, and to make them in those directions where they least mattered to the essence of his doctrine. To call him a polytheist because he allowed the word " truth " to be written, as of old, by means of a hieroglyph which was a figure of the Goddess of Truth is mere stupidity.

Such was the man and such was the episode in which he figured. We may now turn to the scene on which it was enacted. Near the village of Et Till the hills which form the beginning of the high desert in Egypt come down to the river edge both to the north and south, thus enclosing a semicircular sandy plain whose diameter is the Nile and whose circumference is the barrier of desert cliff. This was the spot which Akhenaton chose for his new capital. The ruins, covered with a thin layer of sand, lie not half a mile from the river, and are five miles in length by half a mile in breadth. In the face of the cliffs, between two and three miles from the town, lie the rock-hewn tombs of the nobles, some finished and probably never used, others not even finished, for the town was inhabited for no more than about twenty years. Several striking valleys run far eastward into the desert, and in one of these are the royal tombs, two unfinished, and the third in part at least finished, and used for the burial of one or more of the king's numerous daughters, perhaps also for that of Akhenaton himself, though his body was, as we have seen, afterwards removed to Thebes. At various points in the cliffs tablets are cut in the rock marking out the boundaries of Akhetaton, and bearing long and important inscriptions. Three of these tablets are also found in the cliffs on the western side of the Nile, for Akhetaton in theory extended on both sides of the river.

As early as 1824 an English explorer, Wilkinson, visited the tombs of the nobles, and also re-discovered the famous alabaster quarry of Hatnub away in the desert behind them. The town mounds, however, attracted less attention until 1887, when a happy, or unhappy, accident brought them before the notice of the archæological world. A native of Et Till, digging among the ruins for the rich manure-earth known as *sebakh*, found in the ruins of a house a large number of baked clay tablets covered with cuneiform writing. These were taken to Cairo and declared forgeries by the museum experts, and a similar judgment was passed on some specimens sent to Paris for examination. Thereupon the antiquity dealer into whose hands they had fallen loaded them into sacks, and hawked them up and down Egypt in the attempt to get a few piastres for them. After some had been lost, some ground to powder, and nearly all injured, a lucky chance brought them into hands which could appreciate them, and they now lie partly in our British Museum, and partly in other museums. These tablets, when translated, turned out to be nothing less than the archives of the Egyptian Foreign Office during the reign of Akhenaton and part of that of his father. They consist of a series of letters, written in Babylonian—the diplomatic language of the period, just as French is to-day—passing between Egypt and the various powers and cities of nearer Asia. They constitute an almost complete history of Syria in this period, in which we see the Hittites and Khabiri pressing on, detaching one by one the various members of the Egyptian empire in Asia, whose frenzied appeals to Egypt for help went unheeded by Akhenaton and his court, busy singing their hymns to the Disk in Akhetaton. The end of the story may be told here. One by one the conquests of Akhenaton's warrior fathers were lost, and despite a scene in one of the nobles' tombs which represents the Syrian tribute as still arriving in the twelfth year of the reign, no attempt was made to meet the crisis, and within twenty years the conquests of two hundred were lost.

The finding of the tablets gave promise of exciting discoveries at Tell-el-Amarna, and in 1891 Flinders Petrie made there an excavation of considerable importance. Among the town mounds he discovered the Disk-temple and the Royal Palace with its famous painted plaster pavement, which attracted tourists to the spot until, in 1913, it was virtually destroyed by a foolish native to spite a fellow-villager entrusted with its protection. In the waste-heaps of the Palace Petrie found fragments of imported painted vases of a kind known in Crete and elsewhere, while the various houses which he laid bare gave us our first knowledge of the plan of the Egyptian dwelling, and large quantities of objects of the beautiful glass for which the spot has ever since been renowned.

There is next a gap in the history of discovery on the site until 1906, when the appearance of fine objects of Akhenaton's reign in the shops of the Cairo dealers tempted a German archæological society, the Deutsche Orient-Gesellschaft, to make a trial excavation there. This gave such promising results that the Society decided on undertaking the complete clearance of the town mounds, which was begun in 1910 and was still in progress in 1914. During this time about one-fifth of the town area had been excavated and planned, very great additions had been made to our knowledge of Egyptian domestic architecture and town-planning, a wonderful group of statues in the peculiar style of the period had been found, but, it must be admitted, no very striking contribution had been made to the history of the " heretic " and his " heresy."

In 1914 the claim of the Deutsche Orient-Gesellschaft to the site naturally lapsed, and in 1920 the site was granted to the Egypt Exploration Society, then anxious to resume its excavations in Egypt, interrupted in a course of over thirty years only by the war.

The first campaign was opened in December 1920 and continued until the end of March 1921. The general plan was to continue the systematic clearing, recording, and planning of the town site, but at the same time to attempt to find the cemetery in which were buried the middle and poorer classes, as opposed to the nobles, whose rock-tombs in the cliffs have already been described.

In the town area it was observed that the German excavations had been mainly devoted to clearing the houses on both sides of a long street more than fifty yards broad, but quite unpaved, which ran from north to south near the eastern edge of the town. It therefore seemed advisable, instead of continuing farther along this street, called by our predecessors the Street of the High Priest, after one of the finest houses in it, to start from some point in it and work westward, with the view of clearing a whole block or quarter of the town, and finding the general plan on which the houses both large and small were set out. At an early period in the excavation a new street was found west of and parallel to that of the High Priest, and the systematic clearance of the block between these was begun.

Each house of any pretensions to size was situated in its own garden. This had a surrounding wall, no less than ten feet high in many cases, and contained a well (ensuring to the house its private water-supply), stables, servants' quarters, and granaries. The house itself was built entirely of unbaked mud-brick, though in a few cases limestone was used for door-posts and thresholds. The floors were all of mud-brick covered with a thin mud-plaster. The roof was of the type still seen in native houses in Egypt. Rough logs and beams were laid across from wall to wall; these were covered with smaller boughs and twigs placed at right angles to them; over these, again, were laid reeds, bound together in some cases into rough mats, and the whole was surmounted by a thick layer of mud.

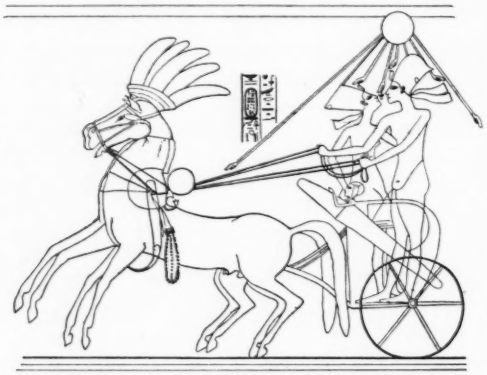
The arrangement of rooms was simple. In the centre of every house lay a square room which we may call the Central Hall. As it was surrounded on all sides by rooms, it could only be lighted by carrying its walls up higher than those of the surrounding apartments, and inserting small windows in them at a high level. In the Central Hall, as, indeed, in most of the larger rooms, the roof span was considerable, and so one or more columns of wood set on limestone bases were used to support the roofing material. In every Central Hall two pieces of furniture commanded notice. The first was a limestone slab with a raised edge, and on one side a small runnel leading off into a movable pot sunk in the earth. This slab was used for ceremonial ablutions, probably before meals and after a journey. The traveller stood on a small smooth block of stone, which was placed in the centre of the slab for the purpose, while water was poured over his hands and feet by servants and flowed off into the vase, which was then removed. The other striking piece of equipment is the hearth. Near the centre of the floor lay an open dish of pottery, about eighteen inches in diameter, filled with burnt charcoal, and set in the mud of the flooring, here raised a little for the purpose.

To the north and west respectively of the Central Hall lay two rooms exactly alike. These have been called the North and the West Loggia respectively. The name " loggia " seems suitable, since each room is long and narrow, with a window so large and so long as to lay the room half open to the weather. The occurrence of two similar rooms has been explained on climatic

A TYPICAL HOUSE AFTER EXCAVATION. PART OF THE GREAT AMPHITHEATRE FORMED BY THE SANDHILLS OF THE EASTERN DESERT IS SEEN IN THE BACKGROUND.
Reproduced by courtesy of the Egypt Exploration Society.)

grounds. In the summer the West Loggia would be insufferably hot during two-thirds of the day, while in the winter the North Loggia would on many days, as anyone who has lived in Egypt will testify, be very uncomfortably cold. With two loggias all extremes of climate could be met. The entrances to the house, usually two, lay through the loggias, which were approached from outside up a few shallow steps and through a small anteroom.

South and east of the Central Hall lay the domestic quarters, and the bathroom, which was always present in a good house. The bath was precisely similar to the ablution slab in the Central Hall, but it was often fixed in a corner with side-slabs of stone to protect the mud walls from the splashing. The only other feature of the house which demands notice is the flight of steps which



KING AKHENATON AND HIS QUEEN, HEFERTITI, IN THEIR CHARIOT, WITH THE RAYS OF THE SUN'S DISK SHINING ON THEM.
(Reproduced by courtesy of the Egypt Exploration Society.)

invariably led up from the Central Hall to the roof, where it appears that much of the domestic business was done.

Outside the house the most striking features are the well, which has a narrow winding flight of steps leading to a platform halfway down, where the girls stood to draw up the water from below, and the granaries, round brick structures, sunk about three feet into the ground, and rising six feet above it, with domed tops. In the gardens were found deep pockets of Nile mud sunk in the sand in order to give sustenance to the trees which provided the noble with shade in the heat of the day. A small summer-house beside the well was a feature of many of the larger gardens.

Many houses carried on their door-posts short hymns of praise to the Disk, followed by the names and titles of their owners. Thus the finest house found was in this way identified as that of the Master of the King's Horse, Ranefer. Among the numerous objects discovered in the houses were three silver vases and three bottles of beautiful variegated glass, one of which was in the form of a fish.

The search for tombs was begun in a group of low sandy hills at the foot of the desert cliffs, two miles east of the town. Some brick structures visible in the surface of the sand were excavated and found to be not, as was expected, tomb-shafts, but rooms of small houses. The extension of this excavation resulted in the discovery of a small village completely surrounded by a thick wall. It is difficult to guess the purpose of such a fortified place in this spot. There are, it is true, outlying fortresses to the north and south of Akhetaton, commanding the two narrow passages between the cliffs and the Nile which are the sole entrances into the El Amarna plain; but it is hard to believe that such a fortress could have been built to the east, attack from the desert being unlikely, and the village being in a very unsuitable position for defence. The complete excavation has been left for the next campaign. The main interest of the place, apart from the fact of its being fortified, lies in the fact that, unlike the main town site, it has not been visited by the white ant, and thus practically all the wooden portions of the houses are in almost perfect preservation. Among the most interesting objects found were portions of hand-looms, which, when further excavation has added to their number, may tell us much about the Egyptian system of weaving. But the most striking find was that of a kitchen, left untouched since its last use thirty-three centuries ago, with unused fuel, water-jar, bread oven, cooking-pot, roasting-place, and poker complete.

In the hills overlooking this village there were at the same time discovered a number of small buildings at once recognised as tomb-chapels. An Egyptian tomb always consisted of two parts, a burial chamber in which the body lay, and a chapel in which the daily offerings to the dead owner were made. In this case the tombs lay behind the chapels, farther up the slope. They were vertical shafts cut in the soft rock, with chambers opening off the bottom. Many were unfinished, and from those which had been used the bodies had been removed in antiquity, probably when the court abandoned Akhetaton and returned to Thebes. In one of these chapels a surprise awaited the excavators. On the wall was a funerary prayer, not to the Disk, but to Amon, and in the innermost shrine was a gravestone or stela set up by one Ptahmay, who calls himself "the approved one of the Disk," and who yet makes his prayers for offerings in the tomb not to the Aton, but to the deities Shed and Isis. We must not regard these facts as evidence of Akhenaton's polytheism. This chapel almost certainly dates from the period when the "heresy" of the Disk was nearing its fall, and the good citizens of Akhetaton, seeing which way the wind blew, were anxious to propitiate the old gods whose restoration they already foresaw. And they were shrewd calculators. Within a very few years

of Akhenaton's death, after an ephemeral reign by Sakere, who had married the King's eldest surviving daughter, King Tutankhaton, who had married the second, abandoned the Disk-worship and returned to Thebes and to Amon-Ra. And thus, after a brilliant life of only twenty years, the "Horizon of the Disk" was given over to the sand, which in a few generations overwhelmed it and so preserved it to be disinterred by the inquisitiveness of the twentieth century A.D.

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New Methods of Criminal Investigation

Poroscopy and Graphometry

By G. Frederic Lees

POROSCOPY

FINGER prints as a means of identification in criminal cases have long been held to constitute evidence of the most irrefutable character. For the intricate pattern of curved lines we bear on our hands is never identical in two different persons. You would not find two dactylograms[1] alike, says Galton, one of the most eminent of the founders of this branch of science, if you were to examine a series of 64,000,000; and later criminologists, notably Balthazard, have come to the conclusion that this is an understatement of the truth. Moreover, from birth to death, the finger prints of a human being never change. No alteration is possible, either pathologically or by deliberate choice. It is not possible for anyone to hide his or her identity by destroying those multitudinous patterns on fingers and palms by the use of chemicals, by burning, or by constant rubbing—all practices which are resorted to by the criminal classes. Therefore the malefactor who leaves behind him on the scene of his operations, as he rarely fails to do, a single well-defined finger or palmary print, supplies the police with as faithful a portrait of himself as it is possible to have, and at the same time, presuming he has been arrested on suspicion, an undeniable proof of his guilt.

Stated thus, theoretically, the problem of criminal investigation and identification looks very simple, but in practice all kinds of difficulties are encountered, introducing an element of doubt which has had such weight with some juries that they have rightly refused to convict. The principle generally admitted among judicial authorities is that identity between two finger or palmary prints is incontestable when at least a dozen guiding marks, consisting of the beginnings of lines, bifurcations and islets, are in every respect the same. To be able, however, to come to this clear conclusion, it is necessary to have a fairly large portion of a print under the microscope, and unfortunately the traces which are so carefully collected by the experts of police laboratories on the scene of a murder, burglary, or other offence, are often very fragmentary. Sometimes, too, they are partly obliterated by the prints of persons who have arrived there before the police. Or, again, the criminal may have taken the precaution to cover his hands with gloves or cloth, in which case he may leave but a very small number of utilisable guiding marks behind him.

Supposing that only a very fragmentary finger or palmary print is under examination, showing no more, say, than three or four points of comparison with the print from the hand of a suspected person, is there any other means of arriving at a proof of guilt? Writing in *La Province Médicale* as long ago as 1912, Dr. Edmond Locard, the Director of the Police Laboratory of Lyons, was the first scientist to answer this question in the affirmative. "I believe it is possible, in many cases," he wrote in the course of a detailed statement of this new method of identification, "to make up for the insufficiency of the print considered from the sole point of view of its guiding marks by studying in the trace under examination the arrangement of the pores." Here we have a method—brought to perfection since 1912, and only recently set forth by this distinguished investigator in a work which ought to be translated into every language—which is infinitely more fruitful

[1] The technical name for finger prints. The subject is called *Dactylography* or *Dactyloscopy*.

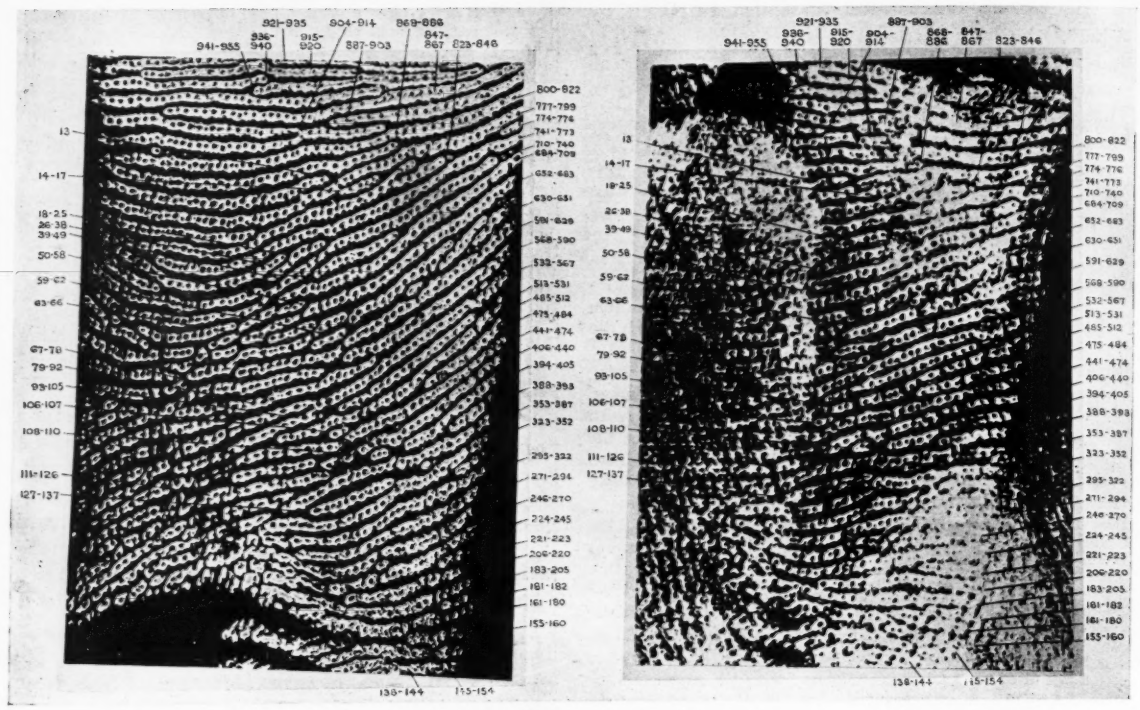

FIG. 1.—COMPARISON OF FINGER PRINTS.

The points wherein the second is shown to correspond with the first are indicated by the numbers in the margin.

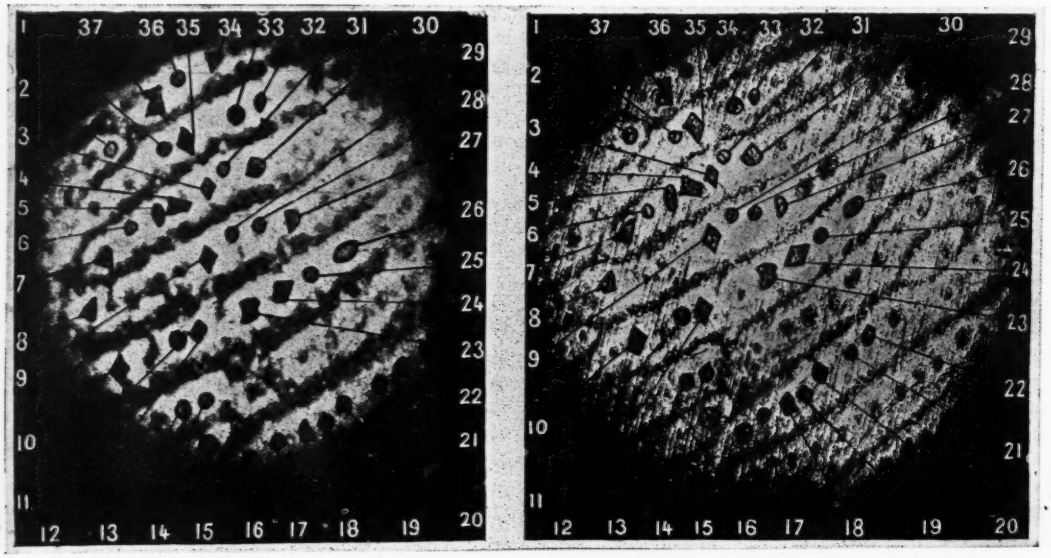

FIG. 2.—IDENTIFICATION BY POROSCOPY.

Even the smallest traces of finger prints can be photographed up to show the pores. In the above reproduction identity of the two impressions is seen to be unmistakable.

in results than the one known by the name of dactyloscopy. Like the patterns on the fingers, the pores between those patterns are unchangeable. Moreover, in shape and in size they are extremely variable, and when the trace of these sudoriferous glands has been enlarged by microphotography, we are provided with an infallible means of identification. The smallest portion of a finger print may thus be utilised, for there are from nine to eighteen of these glands per millimetre. Between one person and another there is also infinite variety in the distances between the pores. "In brief," says Dr. Locard, "the pores, because of their immutability, permanency, and variety, constitute a sign of identity of the first order. Poroscopy (as this science is called), the only method of identification in the case of very small fragments of prints, is, in all cases of dactyloscopic analysis, an important complementary proof. A jury, unimpressed by thirty or forty homologous characteristic points, will be struck by the concordance of shape, position, and number of some hundreds of pores found to be identical in two compared prints. Poroscopic research, which is difficult and hard to carry out on the original traces, even by the use of a lens enlarging five times, is practised by means of large photographic enlargements. With an enlargement of sixteen the work is already easy. For demonstration before a jury one can usefully enlarge up to forty-five times. In practice, poroscopy has very often enabled fragments of prints measuring but a few square millimetres to be used, or half-effaced prints in which only a few points were visible. Above all, it enables one in numerous cases to be clearly affirmative, and strengthens the evidence due to dactyloscopy in a most efficacious manner."

Dr. Locard cites a large number of cases in which this fresh advance in criminology has been successful. As a good example we may take the Boudet-Simonin case, in which two men with these names were arrested on a charge of burgling a flat in Lyons, on June 10, 1912, and stealing a quantity of jewellery and 400 francs. There were no witnesses of the robbery, and nobody could furnish the slightest piece of information regarding the burglars. But a rosewood cabinet, from which the jewels and money had been taken, was literally covered with finger prints. These were revealed by the aid of carbonate of lead and photographed. Search was then made in the finger-print archives of the Lyons Police Laboratory, with the result that certain prints were found to be identical with those of a man Boudet, who had been several times convicted of theft. The man's record at the Sûreté showed that he often worked in collaboration with a man named Simonin. Both were arrested. And it was then found that the finger prints which were not Boudet's were Simonin's. Thirteen prints from the former's hand presented 78 characteristic points; 2 prints made by the latter, including that of the palm of his left hand, showed 94 points of comparison. In the case of the middle finger of Boudet's left hand 901 pores were identified, while in that of Simonin's palm more than 2,000 homologous pores were pointed out to the jury. On this sole piece of evidence the men were sentenced to five years' hard labour, the jury refusing to grant them the benefit of extenuating circumstances. "I am convinced," comments Dr. Locard, "that the demonstration of the homology of the pores played, in the minds of the jurymen, the principal rôle."

Stockis, another well-known criminologist, proved experimentally that the wearing of leather or india-rubber gloves need not prevent the formation of finger prints, and in February 1912, in the S—— case, Dr. Locard put theory into practice by identifying a gloved burglar without any other proof than his finger prints. The print was naturally less clear than that of a bare hand, but nevertheless a fairly large number of guiding marks could be distinguished.

GRAPHOMETRY

Another new method of criminal investigation, which has rightly been declared to be even more mathematical and more scientific than poroscopy, is also due to the science and ingenuity of the head of the Lyons Police Laboratory. It goes by the name of graphometry, and is applied to the recognition of written forgeries. The alteration of a document by means of scratching out, writing over the top, or by tracing can easily be recognised by microscopic examination. X-rays also have been employed to reveal other instances of tampering with documents. But when there is merely imitation of handwriting, and this imitation is apparently perfect, identification of the forgery becomes difficult. How to unmask the forger in such a case as this was the problem which Dr. Locard set out to solve, with complete success.

Dr. Locard's method of revealing the identity of the forger or writer of anonymous letters is based on the fact that there are peculiarities in the handwriting of everyone which cannot be reproduced by the forger, who, whilst attempting to imitate perfectly, involuntarily introduces his own peculiarities into the script. Graphometry, then, consists in decomposing a given piece of writing into measurable elements, and afterwards proceeding to make rigorous comparisons of numbered values. The complete technique of the method cannot possibly be given in a magazine article; but the main principles, illustrated by two or three examples, can be indicated.

These principles are based on four methods of analysis which take into consideration the height of

a given writer's *grammas*, the directions in which these slope, his interruptions—that is, the number of times

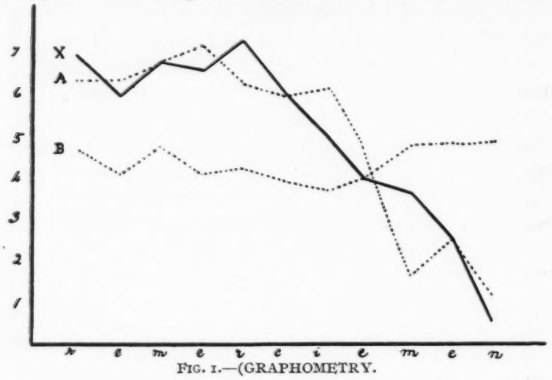

FIG. 1.—(GRAPHOMETRY.

he raises his pen from paper, etc.—and the various shapes of his *grammas*. Let me here note that this new word *gramma*, used by Dr. Locard, means any written character, figure, or sign, and is less apt to lead to confusion than the word "letter" or "character." Height is interpreted by measurements. A given writer, according to the pen he is using, the space at his disposal, and the nature of the text he is writing, traces *grammas* which are sometimes small and sometimes large, but the relation between the height and the breadth of each *gramma* remains constant. The slope of his *grammas* is interpreted by angular values. The frequency with which a writer lifts pen from paper can be calculated and represented graphically by means of curves. And finally, shapes can also be interpreted statistically and translated into comparable curves. The superposition or divergence of the curves thus furnished by two writings makes striking comparisons.

As an example of the first method Dr. Locard takes the word *remerciement* in an anonymous letter (text X) the author of which has to be discovered. The same word occurs in the texts to be compared with it, or in those dictated to two persons, A and B, who are under suspicion. After the various measurements have been made, the chart Fig. 1 is the result. Clearly the writer of the texts X and A are one and the same; B's writing is entirely different. Naturally, it is only

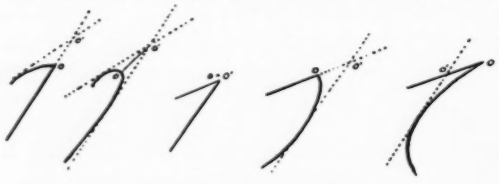

FIG. 2.—(GRAPHOMETRY.

after a number of words have been analysed in this way that a definite conclusion is arrived at.

Variations in the curves of *grammas* are very characteristic, and one of the methods employed in measuring the angles is shown by Fig. 2.

The direction of the slope of the *grammas*—otherwise known as *parallélisme grammatique*—is well shown *graphically* by the word *meurtre* (Fig. 3), the up and down strokes being prolonged until they intersect.

Graphometry in such expert hands as those of Dr. Locard and his assistants is of the greatest value in the detection of the forger or malefactor. Its application has already on numerous occasions met with success, and notably in the case of a post-scriptum to a letter written by a dying soldier at the front—a post-scriptum which, properly legalised, left the whole of his possessions to the receiver of the letter. It was shown by means of the methods outlined above that the same person could not possibly have written both letter and post-scriptum, and Dr. Locard's demonstration was so convincing that the forger at last confessed.

FIG. 3.—(GRAPHOMETRY.)

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New Light on Old Authors

III. The Proscription of 43 B.C.

By R. S. Conway, Litt.D., F.B.A.

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MOST of us have, at some time or other, read Shakespeare's *Julius Cæsar*. But one scene in it, which is grim enough when its meaning comes home to us, is apt to pass away quickly from the memory, because it is rather isolated where it stands in the play. I mean the few lines in Act IV in which Antony, Octavius, and Lepidus confer as to the "Proscription."

Ant. These many, then, shall die; their names are pricked.
Oct. Your brother too must die; consent you, Lepidus?
Lep. I do consent—
Oct. Prick him down, Antony.
Lep. Upon condition Publius shall not live,
Who is your sister's son, Mark Antony.
Ant. He shall not live; look, with a spot I damn him.

The object of this paper is to sketch some aspects of life in Italy during that reign of terror, partly by the help of an inscription which was anciently engraved on marble at Rome, and of which an important part has been recently discovered.

Several large fragments of marble containing what appears to be the eulogy of a husband upon his wife had long been known [1] in Rome, although unluckily only two of the fragments themselves are preserved, the rest being known to us only from copies made after their first discovery. But in 1898 another fragment was found, the contents of which clearly showed that they belonged to the same monument. The inscription is an authentic piece of Roman literature unique in its kind. The style of the writing and the contents alike make it certain that it was set up in the time of Augustus; but the whole offered a kind of historical missing-word puzzle, because the first few lines, which no doubt contained the names of the people whom it concerned, were broken away and lost, so that the inscription was (and is) like a dog that has eaten his label; we could not tell to whom it was to be ascribed. No part of the surviving fragments gives us either the name of the husband or the name of the wife he mourns, though they tell us a great deal else about them. Now, the historian Appian, who wrote in Greek in the second century A.D., included in Book IV of his *History of the Civil Wars* [2] some details of the Proscription in 43 B.C., and scholars have been able to pick out from these a particular Roman noble called Quintus Lucretius Vispullo, whose story tallies with that of the monument. The same story is recorded more briefly by Valerius Maximus,[3] who gives the wife's name as Turia.

Vispullo, then, it was who engraved on marble, at what must have been great cost, a biography of the wife with whom he had lived, as he tells us, for forty-one years, and thanks to whom he had escaped the deadly peril of having been put upon the list of the proscribed. But before we turn to Turia herself, we must try to form some conception of what the Proscription actually was.

After the murder of Julius Cæsar on the "Ides of March" 44 B.C., Mark Antony seized on all his papers and property; and by his eloquent speech to the people drove Brutus and Cassius and the other conspirators to what amounted to exile in Asia Minor, while he departed to govern (and tax) the provinces of Gaul. The Senate hesitated, but at length, roused by Cicero and supported by Octavian, Cæsar's heir, a youth of nineteen who as yet held no political office, decided that they must resist Antony's pretensions. Accordingly the two Consuls, Hirtius and Pansa, with Octavian, raised an army and defeated Antony at Mutina (now Modena), in April 43 B.C.; but Hirtius and Pansa fell in the battle, and Antony and Octavian at once made terms with one another and with Lepidus, another general with an army in the North. One of the conditions on which their compact was formed, a compact which we generally call the Second Triumvirate, was the "Proscription," by which each secured the death, and the confiscation of all the property, of his particular enemies. This list was agreed upon by Antony, Lepidus, and Octavian, at two long sittings, Octavian having at first resisted Antony's demand for the death of Cicero, with whom he, Octavian, had been in most friendly relations since Cæsar's death. However, Octavian gave way, and the Triumvirs marched to Rome at the head of their armies and proclaimed peace; but the first act of the peace was to set up a list of persons—very few of whom had taken part in the Civil Wars or in politics, but all of whom were wealthy—who were to be hunted to death like beasts.

The actual words of this document have been preserved by Appian, and are worth translating here:

"We, Marcus Lepidus, Marcus Antonius, and Octavius Cæsar, having been elected to bring into harmony and order the affairs of the Republic, make the following proclamation. But for the treachery with which disloyal citizens, who had obtained mercy when they prayed for it, never-

[1] *Corp. Insc. Lat.*, vi. 1527 and 31670.

[2] This book is now included in the Loeb series of translations.

[3] In Book VI. 72 of his collection of "Memorable Deeds and Words," dedicated to the Emperor Tiberius (A.D. 14–37).

theless became enemies of him who had shown them kindness and conspired against his life, Gaius Julius Cæsar would never have been slain by those whom he took prisoners in war and mercifully spared and whom one and all he had treated as friends and promoted to honours; nor should we now be compelled to take these measures against all those who have insulted us and proclaimed us public enemies. But as things are, seeing that the wickedness of those who have plotted to destroy us, and by whom Cæsar was slain, cannot be overcome by any kindness, we choose to anticipate our enemies rather than to suffer ourselves. Therefore let no man think that what we do is unjust or cruel or excessive, when he remembers the fate of Cæsar and the wrongs[1] that have been done to us. Cæsar was Dictator and High Priest, and had vanquished and subdued the nations that were most dangerous to Rome, and first of all men had begun to explore the unknown sea beyond the pillars of Hercules, and discovered the land of Britain, hitherto unknown to Rome; yet they slew him in the midst of what they call the sacred Senate-house, under the eyes of the gods, defacing his body with twenty-three wounds, though they had all been taken prisoners by him and spared, and though some of their names were written in his will as his heirs. But the rest, instead of punishing the authors of this abomination, raised them to office and honours, which they abused by seizing on public money[2] for themselves, and levying an army against us. . . . Some of them we have already punished; the rest with God's help you shall shortly see chastised. We have already succeeded in the greatest of our endeavours, and made subject to us Spain and Gaul, and the districts nearer home. One task yet remains: to make war upon the murderers of Cæsar who are across the sea.[3] And since we intend to conduct this war at a distance on your behalf, it does not seem to us to be safe either for us, or for you, to leave the rest of our enemies here behind us, since they would take advantage of our absence, and lie in wait for the accidents of war. Nor do we think that, in the present emergency, we ought to be slow to act from any consideration for them, but rather we must put them one and all out of the way. We have no grudge against any large body of citizens, nor shall we make[4] any choice of our private enemies nor shall we in the least single out those who are wealthy or politically eminent, though it must needs be that three men must have more enemies than one; we shall not slay as many as did the last Dictator whom you called Sulla the Fortunate, although he too was called on to rule the city during a civil war. And though we might arrest those whom we know to be evil without warning, we prefer rather to proclaim their names for your sakes, so that, having them properly named and numbered, the soldiers may abstain from interfering with anyone else. Therefore, with the blessing of Heaven, we give command that none shall receive any of those whose names are written below. Whosoever shall attempt to save them is included in the list. And whosoever shall bring the head of any one of them to us, if he be a free man, shall receive 2,500 drachmæ,[5] but if he be a slave he shall receive 1,000 drachmæ, his freedom and all the civic privileges of his master. The same reward shall be given to anyone who shall give information of their place of hiding. We shall not enter on our records the names of any who earn these rewards."

Then followed the 2,000 names of the victims.

Did ever murder speak so loud? The writing was doubtless that of Antony, but the signature is Octavian's too. Yet within three years of this, Vergil published his Fourth Eclogue, a half-boyish dream of a new era of peace.[6]

Now consider the fate of the venerable patriot and orator Cicero, as related by Plutarch[7]:

"At last he put himself in the hands of his servants, and ordered them to carry him by sea to Caieta, where he had a delightful retreat in the summer. There was a temple of Apollo on the coast, from which a flight of crows came, with great noise, towards Cicero's vessel, as it was making land. They perched on both sides the sail-yard, where some sat croaking and others pecking at the ends of the ropes. All looked upon this as a bad omen; yet Cicero went on shore, and, entering his house, lay down to repose himself. On sight of this the servants began to reproach themselves. Then partly by entreaty, and partly by force, they got him into his litter, and carried him towards the sea.

Meantime the assassins came up. They were commanded by Herennius, a centurion, and Pompilius, a tribune, whom Cicero had formerly defended when under a prosecution. The doors of the house had been made fast, but they broke them open. Still Cicero did not appear, and the servants who were left behind said they knew nothing of him. But a young man, named Philologus, a freedman of his brother Quintus, whom Cicero had instructed in the liberal arts and sciences, informed the tribune that they were carrying the litter through a deep wood to the seaside. The tribune, taking a few soldiers with him, ran to the end of the walk where Cicero's party was to come out. But Cicero, perceiving that Herennius was approaching to meet him, ordered his servants to set the litter down [though a large number[8] of them had gathered and were preparing to defend him by force], and putting his left hand to his chin, as it was his custom

[1] These "wrongs" are only Antony's way of describing the resistance of the Senate to his own armed attempts to make himself emperor.

[2] If there was any truth at all in this charge, it could only relate to provincial revenues. Antony himself had left no money in Rome for anyone else to seize. It was, of course, Antony whose armies were unconstitutional; the senatorial forces were perfectly legal.

[3] That is, Brutus and Cassius.

[4] This and the following clause, *if the negatives be removed*, describe exactly what were the principles on which the list was made up.

[5] Roughly £100, though with a very much greater purchasing power than that amount of money to-day.

[6] On this poem see DISCOVERY, May 1920.

[7] Langhorne's translation, p. 614.

[8] This detail is from Appian.

to do, he looked steadfastly upon his murderers. Such an appearance of misery in his face, wasted with anxiety, so much affected the attendants of Herennius that they covered their faces. Cicero stretched his neck out of the litter to receive the blow, and Herennius slew him. Thus fell Cicero, in the sixty-fourth year of his age. Herennius cut off his head, and, by Antony's command, his hands too, with which he had written the Philippics (denouncing Antony's crimes).

When these parts of Cicero's body were brought to Rome, Antony happened to be holding an assembly for the election of magistrates. He ordered the head and hands to be fastened up over the Rostra, a dreadful spectacle to the Roman people, who thought they did not so much see the face of Cicero, as a picture of Antony's soul."

A glimpse of the outrage inflicted on altogether innocent people is given us by the story of a man called Restio. He had escaped with one slave who had once been a favourite servant, but who had in some way misbehaved himself so that his master had branded him. Restio was startled to find that this slave had followed him, and expected that the slave would now avenge himself by turning informer. The slave, however, told him not to be alarmed because he had not forgotten all the kindness he had received before he was branded, and so took his master to a cave and secretly supplied him with food for several days. Then as he found that several people in the place had begun to suspect his master's retreat, and discovered that a body of soldiers was seeking for him, the slave ran after an old man whom he had noticed going alone along the road, cut off his head, brought it to the soldiers and claimed the reward. The soldiers gave the slave nothing, but snatched away the head, so as to secure the reward for themselves, and hurried back to Rome. The slave then succeeded in getting his master safely off to sea.

The stupidity of the murderers appears very plainly in the proclamation of one of the Triumvirs, Lepidus, who wished to celebrate a Triumph for victories that he had won in Spain; expecting, naturally enough, that people would be in no mood to engage in any public rejoicing, he put up this proclamation: "With the blessing of heaven, all good citizens, male and female, are to offer sacrifice, and observe this day as my festival, and anyone who is found not openly rejoicing shall be included in the list of the proscribed." He conducted his procession amid loud cheers.

And there are some absurdities of a less grim kind. A man called Pomponius, whose name was on the proscribed list, arrayed himself in his full robes of office as a general, and dressing his slaves as lictors, marched through the streets of Rome with these men round him, at the gates demanded public chariots to carry his party, and so made his way through Italy, everyone giving him in terror what he wanted; finally he secured one of the ships of the navy to sail to Sextus Pompey, since he alleged that he had been sent to make peace with him on behalf of the Triumvirs.

Perhaps the most daring device which led to an escape was that of Ventidius, whom we hear of afterwards as a successful commander. He dressed himself up as a centurion, put himself at the head of a force of soldiers, and marched wherever he liked in Italy, searching for a man whose name was on the proscribed lists and whom, strangely enough, he could never find;—the man he was searching for was himself!

Two samples of the devotion of slaves to their masters should not be omitted. The names of the slaves are not even known. A favourite slave of Appius, hearing that the soldiers were searching for his master, dressed himself up in his master's clothes and lay down on his master's couch, with his back to the light. The soldiers came and killed him, but the delay enabled his master to escape. And a man called Milennius escaped by the similar devotion of another slave, who dressed himself as his master, entered his master's sedan-chair, and persuaded his fellow-slaves to carry him off in it and to break into a run just as the soldiers came into sight. They, seeing the litter being carried off, rushed after it and killed the faithful slave. But Milennius managed to escape.

Now turn to the story of Quintus Lucretius Vispullo himself, as Appian tells it.

Vispullo was wandering about the country with two good servants, but through lack of supplies was forced to turn homewards, riding in a litter as a sick man. But one of his bearers had injured his leg, so Vispullo had to walk, leaning on the other. As they came in sight of the gate[1] he saw a troop of soldiers running out; and, remembering that his father had been caught on that very spot in the proscription of Sulla, he turned aside with one of his servants to hide in one of the tombs that stood beside the road. There they were safe until the evening, when they were visited by a party of tomb-robbers. But this faithful slave gave himself up to be stripped of all he had to allow his master to escape. But Vispullo waited for him at the gate, and shared his clothes with him; so they safely reached his house in Rome, where his wife concealed him between the two parts of a double roof, until at last some friend succeeded in getting his name removed by Octavian from the list of the proscribed.

The identification of Vispullo with the author of the inscription has been worked out very carefully by Mommsen, whose commentary[2] on the chronological, historical, and legal points of the case left really nothing

[1] Anyone who has been at Rome will remember how straight a course the Appian Way keeps for miles outside the gate.

[2] See his notes in the *Corp. Inscc. Lat.* at the places already cited.

else for later scholars to add. But on the literary side of the inscription—in other words, on its interest as a record of human character and feeling—he has not a word to say. It was quite characteristic of the great Prussian to feel no interest in that. Not the least of the services rendered to letters by the late Dr. Warde Fowler was the chapter in his *Social Life at Rome* in which he dealt with the inscription from this point of view; and to this the reader may be referred for further details.

The inscription from which I will now translate a few paragraphs was erected by Vispullo himself in memory of his wife when she died, after they had enjoyed many years of life together under the firm but peaceful rule of the mature Augustus. The inscription is written in praise of the dead lady, but it differs in a characteristic way from other ancient sepulchral eulogies in that it is addressed, not to the passer-by, nor to the public, nor to the family of the dead or of the speaker, but to the dead lady herself; so that it has an intimate tone very unlike that of a funeral speech.

"Such long union as we enjoyed, ended only by death, is rare, for we lived happily together for forty-one years, and you left me only to wish that the parting had come by my death and not by yours, as would, indeed, have been natural since I was the elder. I need not speak of all the good qualities which you shared with other true wives, your faithfulness, obedience, courtesy, and good humour; your assiduity in spinning and weaving, your religion without superstition, your inconspicuous dress and modest way of life, your affection for your own family, your kindness to your household, which you extended as much to my mother as to your own parents. But some qualities I must claim as having been peculiarly your own, and they are such as Fortune has made rare in human experience."

He then mentions various examples of her liberality and her administrative powers; and proceeds to describe how she had saved him on two separate occasions in the Civil War. The first appears to have been in 48 B.C., when Vispullo left Italy to join Pompey when he fled to Pharsalia; Vispullo was then put in command of Pompey's fleet in the Adriatic, which in vain attempted to prevent Cæsar's crossing. On this occasion Turia gave him all her pearls and personal ornaments, and not only continued to send him fresh supplies from the estate, but defended the house first from a troop of Julius Cæsar's army—until Cæsar called them off; and then a year later (47 B.C.) from what seems to have been a siege by Milo, who was then wandering about the South of Italy with a band of cut-throats. This incident is related on what survives of the fragment most recently discovered. Of his own later deliverance and his wife's share in it Vispullo writes thus:

"I can hardly persuade myself to bring into the light of day our dearest and most treasured memories, by telling how I was saved by a sudden message which you sent me warning me of pressing danger; you refused to let me make the rash attempt to escape from Italy, and persuaded me to adopt wiser counsels; you prepared for me a safe hiding-place, taking your sister and her husband into the secret, though thus they also took a share in my danger. I could not tell the whole story if I tried. It is enough to record that you saved[1] me. But I will confess that the bitterest experience I ever suffered was after my restoration had been granted by the generous decision of Augustus Cæsar, at a time when he was absent from Rome. For then you boldly requested his colleague Marcus Lepidus, who was in Rome, to carry out my restoration. But when you bowed before Lepidus he not merely refused to lift you up, but ordered you to be dragged away and hustled and beaten like a slave. Your courage was not subdued and you forced him to recognise Cæsar's edict, openly protesting against his insult, so that the world might know who had been the author of the danger in which I stood. And it was not long before that author had reason to regret what he had done. . . . When peace was restored to the world and quiet government re-established, happy times fell to us too. We longed for children, which Fortune for a time had grudged us. And if only Fortune had continued the kindness which she began to show, we should have lacked no happiness; but her decree was otherwise."

Vispullo then passed to what seems to have struck him as one of the greatest of his wife's virtues, and we can at least realise the unselfishness of her attitude. From the phrase which follows we gather that they lost their only daughter soon after she was born; some years after that Turia made to her husband the proposal that he should divorce her in order to marry some wife who might bear him children, promising that she would treat the new wife like a sister and her children as if they were her own kin. Whatever we may think of this suggestion, Vispullo knew quite well what he thought. "I must confess that I was almost out of my mind to think that any divorce between us could be made except by death; that you should dream of ceasing to be my wife while you still lived, when you had been faithful to me all the years during which I had been almost a banished man. What desire or need had I of children that I should break my faith

[1] This reticence is interesting. Vispullo seems to have felt that the actual details of his concealment would be out of harmony with the dignified grace of this record, which was to be engraved on marble.

to you and sacrifice a certain for a doubtful happiness? I could not have yielded to such a suggestion without dishonour to myself and misery to us both."

He then relates how in accordance with Turia's own desire he had adopted a daughter, and this is how the long inscription ends:

"I might dwell on all your forethought and good counsel, but I must reserve this space rather for a tribute to your goodness, so that at least I may show how deeply I lament the wife whose memory I have sought to consecrate for ever. Do not think that your example will be forgotten, for your fair renown meets me at every turn and teaches me to be brave against ill-fortune. Fate has not robbed me of everything since it still suffers me to cherish the memory of your goodness, though I have lost all the peace of my soul in losing you. When I think how you were wont to foresee and provide against my dangers, I am broken down with the thought of my calamity, and I cannot be faithful to my promise not to grieve. Grief overcomes my resolution, and I am plunged in sorrow whether I look forward or backward; and the very greatness of your memory makes the rest of my life promise nothing but days of mourning. My last word shall be that there was nothing which your goodness did not deserve, but that I never succeeded in paying my debt. I have counted your last commands as a law, but I will spare no honour which they did not forbid me to render you. And now I pray that the gods with whom your spirit is give you peace now and for ever."

The Study of Plankton

By J. Travis Jenkins, D.Sc., Ph.D.

MARINE organisms can be roughly divided into three groups according to their mode of life; the *plankton*[1] or drifters, the *nekton* or swimmers, and the *benthos*[2] or fixed organisms. The division is very convenient for students of marine life, but it must not be pressed too far, since many animals and plants belong to one group at one stage of their life-history, to another group at another stage. To the first group, the *plankton*, belong all those creatures which, owing either to their small size or feeble muscular development, are unable to make any headway against a current, but drift about at the mercy of the wind and tide. Only quite recently has the importance of this group been recognised; it is now generally regarded as the source of all organic matter in the sea.

Nearly all marine animals or plants are represented at some stage or other of their life-history in the plankton. Life swarms in all the surface layers of the ocean that are penetrated by sunlight. This life depends ultimately on the power which marine plants possess of manufacturing organic substance from inorganic by means of their chlorophyll corpuscules, the energy being supplied by sunlight. Most people have an erroneous idea of marine plant life. The floor of the ocean is not covered with marine forests. Only along the comparatively limited area of the littoral zone is there any growth of fixed marine plants. By far the greater quantity of marine plants are microscopic in size, they float in the surface layers and consequently belong to the plankton. They are the true pastures of the sea, and upon their abundance all animal life depends, including our food fish of economic importance, and, consequently, our great sea fisheries.

There is therefore no reason for surprise that the plankton has been extensively studied during the last decade or so, and voluminous works have been published dealing with this branch of marine biology. The plankton group is of enormous extent and astounding variety. The skeletal remains of former planktons form vast deposits on all the ocean floors. These planktonic deposits are found nearly everywhere, except where the solvent action of the salt water has removed the bulk of the skeletal remains. The various oozes—*Diatomaceous*, *Radiolarian*, and *Globigerina*—are derived from the remains of planktonic organisms.

The abundance of the vegetable plankton depends on the presence of certain chemical elements in the seawater. Where these elements are present in the greatest abundance the plankton is richest.

Many open-sea fish live directly on the plankton. These plankton-eaters, which include the herring, sprat and mackerel, are provided with comb-like structures—the gill-rakers—which are attached to the gills and act as food strainers.

When the fish breathes, water is taken through the mouth and passed out over the gills, and during this process minute organisms of the plankton are retained by the gill-rakers, whence they are washed off by the fish's tongue and swallowed. If the contents of the stomach of an open-sea fish such as a mackerel be examined, they will be found to consist of planktonic crustacea; as, for instance, the young of the hermit crab, the second stage in the development of the Norway lobster (*Nephrops*) and prawns (*Palinurus*).

The various organisms met with in the plankton are now well known. Not only have they been identified and described, but chemical analyses of the group have been made and comparisons with land animals and plants instituted. We have already noted that nearly all marine animals are represented in the plankton at some stage or other of their life-history. Fish are found in the egg and larval stage. With the

[1] Literally, "tossed (by the waves)."
[2] Literally, "the great depth."

exception of the herring, all our food fish of economic importance lay eggs which are lighter than sea-water and which, therefore, float upwards to the surface layers, where they are found in great abundance in

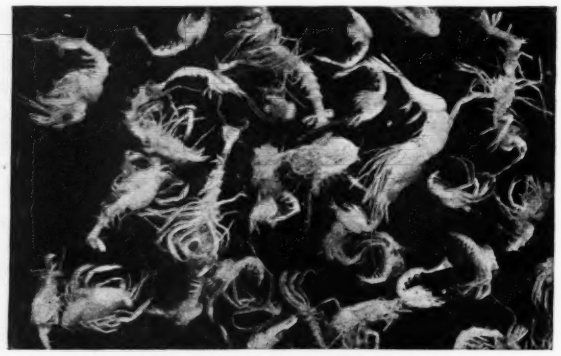

FIG. 1.—FOOD OF MACKEREL.

the spring months of the year. The two great families of economic value, the Cod family (*Gadidæ*) and the Plaice family (*Pleuronectidæ*), are represented in the surface waters of the British Isles by many millions of eggs and larvæ every spring. These eggs may be captured by towing a small-meshed net through the water, a method in which muslin or silk bolting cloth is the material generally used. If the contents of the net be washed out and examined with a hand lens, numerous globules of gelatinous matter are readily distinguished. These are the floating fish-eggs. Many hundreds are seen in a typical haul, but it is impossible in most cases to recognise the species without careful examination under the microscope.

The egg of the plaice may usually be recognised by its large size. The cod and whiting have smaller eggs, and, generally speaking, they are surrounded by numbers of a small cope-pod crustacean (*Calanus*). Later in life our food fish belong to the Nekton, since they are able to move independently of the currents. Economically speaking, crustacea form one of the most important groups in the plankton, if we exclude fish. Some of the crustacea are represented in both their young and adult stages, others in the larval condition only. The edible crab, which passes its adult stage on the bottom (Benthos), passes through a free-swimming life-history in which two main stages have been recognised; in both of these stages it belongs to the plankton.

The first larval stage of the crab is the *Zœa*, in which the carapace, or upper shell-covering, bears a long spine. This is followed by a stage in which the body gradually assumes a crab-like appearance, though the tail is still extended, as in the lobster, and not curled up under the carapace. This is known as the *Megalopa* stage.

Even the fixed crustacea, such as the common barnacle, pass through a free-swimming larval stage, in which they belong to the plankton. The larvæ of the barnacle are distinguished by three pairs of swimming appendages and are known as *Nauplii*.

Our edible mollusca, such as the oyster, cockle, and mussel, appear in the plankton only in the larval stage. Other mollusca, such as the *Heteropoda* and *Pteropoda*, spend the whole of their life as plankton organisms.

Marine worms, generally speaking, are only found in the plankton during their larval stages, but there exist a few forms which are found only in the open sea, such as the arrow-worm (*Sagitta*). Jelly-fish, or *Medusæ*, are also members of the group. Most of the common jelly-fish are large and easily recognisable, but there are several forms which are small enough to be taken in the tow net. Two of the commonest of these small forms in British seas are known as *Pleurobrachia* and *Beroe*. The former is known to the fishermen as the "Marble-bleb," and is often taken in the shrimp trawl.

All the forms hitherto mentioned definitely belong to the animal world. Other constituents of the plankton belong no less clearly to the vegetable world, while others still are of doubtful position. So numerous are the plankton organisms that it is no exaggeration to say that every drop of sea-water near the surface contains some form of life. Countless multitudes of unicellular forms of life are encountered. The most important animal forms belong to the *Infusoria*, *Foraminifera*, and *Radiolaria*. Of the plants the most important group is that of the *Diatoms*. *Infusoria* are more common in fresh-

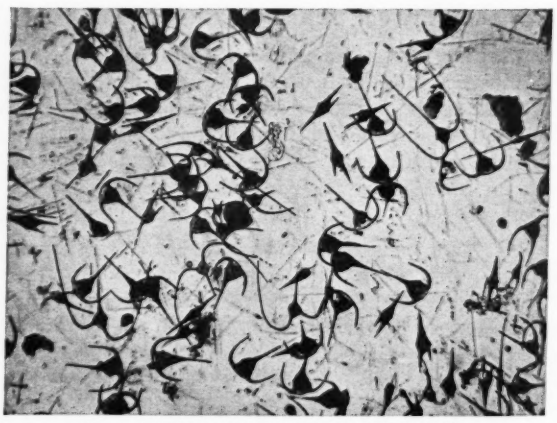

FIG. 2.—PERIDINIAN PLANKTON (*CERATIUM*).

water plankton than in the sea. Nevertheless, one of the commonest of local organisms belongs to the *Peridinians*, which are *Infusoria* provided with shells

and *flagella* (lash-like appendages). The form known as *Ceratium* is the most abundant.

The phosphorescence noticeable in the North and Baltic Seas is usually due to *Ceratium*; in the Irish Sea, on the other hand, it is due to *Noctiluca*, a flagellate infusorian which is so abundant that at times the water is discoloured by it.

Careful comparisons have been made between the productivity of the sea and of cultivated land, and it is found that the sea is about 20 per cent. below cultivated land in fertility. Further research and experiment are, however, necessary before generalisations of this kind can be made with confidence.

Standards of Correctness in English[1]

By Henry Cecil Wyld, M.A.

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(*Continued from p. 234 in the September number*).

THE sources of our information as to the pronunciation of the 17th and 18th centuries are of three kinds —(*a*) private letters and diaries in which the writers often depart from the regular and 'correct' spelling, and unconsciously spell as they pronounce; (*b*) statements of grammarians and writers on pronunciation; (*c*) rhymes of poets. Of these the first are the best. The material they afford is very copious, and as we find the same spellings occurring several times, in the letters of different persons, they must be taken seriously; as the writers of the letters are expressing themselves in a natural unstudied manner, we almost gain the impression that we are actually listening to them speaking; further, many of the unstudied spellings, which tell us so much, are used by the writers on pronunciation of about the same time to express identical pronunciations.

The best collections of letters for our purpose are those contained in the *Memoirs of the Verney Family* (1639–1696), edited by Lady Verney, four vols., 189–; the letters of Mrs. Basire, in *Correspondence of Dr. and Mrs. Basire*, ed. Dr. Darnell, 1831 (Mrs. Basire's letters cover from 1651 to 1661); for the 18th century we have the *Wentworth Papers* (ed. Cartwright, 1883), and especially the letters therein of Lady Wentworth, her son Peter, and her daughter-in-law Lady Strafford. These letters cover the period 1705–1739.

The Verneys were an ancient county family living at Claydon in Buckinghamshire, not far from the Oxfordshire border. The letters are from Sir Edmund Verney ('the Standard Bearer'), his son Sir Ralph, the wife and sisters of the latter, his uncle Dr. Denton, and his cousins and friends, a large and representative circle. The writers of these letters are all persons of the same class—that of the wealthier squires, and in some cases peers and their wives. Some of them write from the country, others from London, where they occupied positions about the Court or in the Government. Many are travelled and highly cultivated persons.

Mrs. Basire, who belonged to an old Shropshire family of the same standing and position as the Verneys, was the wife of the Rev. Dr. Basire, a French nobleman by birth, who came in his youth to England, studied at Cambridge, took orders in the Church of England and became Rector of Egglescliff, co. Durham, and subsequently Archdeacon of Northumberland. He was exiled from this country on the fall of the Monarchy, but returned and lived happily with his family after the Restoration.

Lady Wentworth lived in the best society of her day. She had been Lady of the Bedchamber to the Queen of James II. Her eldest son, who afterwards became Earl of Strafford, was for a long time ambassador at Berlin.

All these people, then, belong to the higher ranks of society, they all belong to the same world, are persons of education and social experience, and we may take it that their speech, which, by the way, shows remarkable similarity, represents the best type of English spoken in their day. It is also the natural traditional development of the English of the 16th century, so far as we are able to form an idea of this from materials of the same kind as these letters, written by Elizabeth and her contemporaries.

I have selected for treatment the following general subjects: (1) pronunciation of consonantal sounds; (2) pronunciation of vowels in unaccented syllables.

1. Pronunciation of Consonants and Combinations of Consonants

(a) *Substitution of* -n *for* -ng *in the suffix* -ing

Much has been written, and more said, often in derision of the habit, which still survives in nearly all popular dialects and among many speakers of standard English, of saying *rainin'*, *huntin'*, *comin'*, and so on. So far from being a modern affectation, this pronunciation is found as early as the 14th century. The evidence of spellings, the statements of gram-

[1] Readers desiring a bibliography of the writers mentioned in Prof. Wyld's article are referred to the September number, page 234.

marians, and poets' rhymes leads me to believe that it was practically universal during the 17th and 18th centuries.

The Verney Memoirs have: *seein, missin, bein, comin, beggin, shillins, disoblegin, lodgins;* Cooper, one of the best writers on 17th century pronunciation (1685), says that *coughing* and *coffin, coming* and *cummin* are pronounced alike. The celebrated Lord Rochester (died 1680) rhymes *farthing—bear-garden*. Lady Wentworth writes *takin, dynin-room, lodgins, buildin, devertin, prancin along, fardin, mornin, writins,* and so on. Pope rhymes *gardens—farthings* (cf. Lord Rochester above).

Walker, whose authority on questions of pronunciation stood very high in his own day and for long afterwards, asserts in his *Rhetorical Grammar* (3rd ed., 1801), that the best speakers invariably pronounce *-in* when the body of the word is in *-ing,* and say *singin, bringin,* and so on, whereas even in other words they often pronounce *-in,* though he says that in this case he prefers *-ing,* 'when the language has the least solemnity,' but considers *-in* but 'a trifling omission.'

(b) su- *pronounced as* shu-

We all agree, I fancy, in pronouncing *sh-* in *sure* and *sugar,* but should hardly pronounce *suit* in the same way as *shoot*. The 17th century knew no such distinctions. The Verney Memoirs have *shur, shewer,* but also *shuite* (of clothes), *shewtid* 'suited.' Mrs. Basire has *ashoure* 'assure,' and *shut* 'suit.' Jones, a most reliable writer on pronunciation (1701), says that *sh-* is pronounced in *assume, consume, ensue, sue,* and *suet,* in addition to the words where we still pronounce it.

(c) -di- *pronounced like* -dg- *or* -dj-

In words like *tedious, immediate* we now pronounce a distinct *d* followed by a short *i*. Not so our ancestors. One of the Miss Verneys writes *teges* 'tedious' = evidently 'te-jus,' and her friend Lady Sussex writes *sogers,* a pronunciation in which many would still agree with her, except that they would not now omit the *l*. Jones indicates an identical pronunciation by the spellings *soger, Injan*. Lady Wentworth writes *emedgetly*. Walker says that polite speakers always pronounce *edjucate, verdjure, verchew,* and that they *ought* to say *ogeous, insidgeous, Injean*. Leigh Hunt records that John Kemble the actor still said *ojus, hijjus, perfijjus*.

(d) *Loss of* -d- *before and after another consonant*

Wensday is common from the middle of the 15th century onwards, and occurs in the letters of the Verneys and Lady Wentworth, besides being noted by Jones, who also says that *d* is not pronounced in *friendly, handmaid, candle, handle, kindle, children,* and so on. *Lunnon* for *London,* which survived as a polite pronunciation far into the 19th century among old-fashioned speakers, is found written *Lonan* by Mrs. Basire in 1654, is referred to by Gray in a letter to Horace Walpole (1757), and is vouched for by Elphinston (1787), a most meticulous writer on English pronunciation, who says 'we generally hear *Lunnon*.'

(e) *Loss of* -t- *before and after other consonants*

Wascote 'waistcoat' is found in a letter of Edward Alleyne the actor in 1593, and as *wascott* in that of one of the Verneys in 1639. The Verney Memoirs have also *Chrismas, Crismus, Coven Garden*; Lady Wentworth writes *Crismass, Wesminster, crisned, Shasbury* 'Shaftesbury.' Jones gives a long list of words in which *t* is omitted, including *Christmass, costly, ghostly, lastly, beastly, listless, mostly, roast beef, wristband, saltcellar, Wiltshire,* etc., etc.

(f) *Loss of final* -d

Numerous examples occur from the 14th century onwards. One of the Verneys has *friten* as a past participle. Cooper gives *thousn* as the pronunciation of *thousand*. Lady Wentworth writes *poun, thousen, dyomons, own* 'owned,' *scaffels*. Jones indicates that *-d* is not heard in *beyond, diamond, scaffold,* and many other words.

(g) *Loss of final* -t

The Verneys and their relatives write *respeck, gretis* 'greatest,' *Papeses, honis* 'honest,' *Mundy nex,* '*res* of our neighbours.'

Jones has a list of *t*-less words, including *respect, strict, sect, distinct,* etc. He also says that *pageant* is pronounced *pagin*.

Lady Wentworth writes *prospeck, richis* 'richest,' *tex,* and her son Peter, *strick* 'strict.' Baker, a writer on pronunciation (1725), writes *Egip, poscrip,* etc.

(h) *Addition of* y- *initially before* e

Yearth is the regular spelling in Edward VI's First Prayer Book (1549), and this and other forms of the kind are not infrequent in the 16th century even in literary works. The Verneys write *yearnestly* 'earnestly,' *yeare* 'ear' (a pronunciation which I have often heard from old-fashioned speakers whose English was irreproachable). Cooper indicates *yerb* and *yearth* with disapproval, and Lord Chesterfield gives the latter as a vulgarism in his day.

(i) *Addition of* d *and* t *finally after* n, l, s, *etc.*

Spellings such as *jaylardes, to past away, lynand* 'linen,' *wyld* 'will,' *synst* 'since,' and so on are fairly

frequent in writings of various kinds, from the 15th century onwards. *Orphant* is frequent in the 16th century. The pronunciations which these spellings represent appear to have been common among educated speakers late into the 18th century. We may note that *vilde* 'vile' is a frequent spelling in Shakespeare (First Fol.), and that Donne rhymes *vilde* and *child*. The Verneys and their friends write *schollards* (Sir Ralph himself), *micklemust* 'Michaelmas,' *the hold yeare* 'whole,' *gownd* 'gown'; Swift rhymes *ferment* —*vermin*. Peter Wentworth writes, 'made the house *laught*,' 'not *saft* (safe) for me,' *sarment* 'sermon' (as does Lady Wentworth), *liked* 'like.' Lady Wentworth writes *gownds*, and her daughter-in-law Lady Strafford '*lost* of time.' Elphinstone, however, considers *sermont, drownd* (Inf.), *gownd, scollard, wonst* 'once' as vulgarisms, and Pegge (1814) records as vulgarisms typical of London, *verment* 'vermin,' *serment* 'sermon,' *nyst* 'nice,' and *margent*. It is clear that such pronunciations were in use among persons who were by no means vulgar fifty or sixty years earlier. *Margent*, strange to say, instead of *margin* survives as a poetical form and is used by Tennyson.

(j) d *for* t *and* b *for* p *between vowels*

Such pronunciations as *prodestant, Jubiter* may still be heard at the present time, and they would hardly be considered vulgarisms. There are plenty of examples of spellings indicating similar pronunciations during the 15th and 16th centuries. They evidently existed also in the period we are considering. Sir R. Verney writes *debutye*, and other writers in the Verney Memoirs have *prodistants, medigate* (mitigate), *Debity*. Jones says that as *b* is 'easier and sweeter' than *p*, the latter often 'takes the sound of *b*.' He indicates that *b* is pronounced in *capable, culpable, deputy, Gospel, Jupiter*, etc. Lady Wentworth writes *prodistant* and Lady Strafford *prodistation*. Elphinstone considers *proddestant* and *pardner* as London vulgarisms.

2. Vowels in Unaccented Syllables

I pass now to consider the pronunciation of vowels in unaccented syllables. This question has been much canvassed of late, and it has been maintained that English has been degraded and impoverished by the universal habit among us of obscuring vowels in an unaccented position, and altering them from what is said to be the true sound, namely, that which they would have if they were fully accented. This view may be the right one—who shall decide the question? —but in any case the process of obscuring unaccented vowels is not a new one, and our generation is not responsible.

Already in the 14th century, and still more in the 15th, the frequent spellings prove that vowels when unaccented were *not* pronounced as if they were accented, but were altered, pretty much, apparently, as at the present time, only probably rather more consistently. For, while in most cases Englishmen at the present time who speak naturally and not according to theory, do alter their unaccented vowels, there are some words in which the full sound has been restored in deference to the spelling. Thus we often pronounce *fellow* with an '*o*-sound' in the second syllable instead of making the word rhyme with *prunella* as Pope did. Again, we pronounce an '*o*-sound' in *obey, obedience*, whereas in the 15th and 16th centuries these words are occasionally written *abay*, etc. These things have now become traditional, but they are modern for all that. We sometimes hear the second syllable of *fortune* pronounced like *tune*. This may or may not be a good thing to do, but, as we shall see, it is a modern innovation.

Out of the large mass of evidence regarding the treatment of unaccented vowels in the past, I can, for lack of space, only select a few examples. I begin with one of the most striking cases, where we have now often 'restored' the full vowel, though in some cases we still adhere to the old pronunciation. I refer to *u* in words borrowed from Norman-French.

We have the natural, traditional pronunciation of unaccented *u*, that is short *i* in *minute* (60 seconds), *biscuit*, and *conduit*, though as regards the last, although I have always heard it called '*kundit*,' I am told that it is now pronounced '*kondewit*' by some. I can only hope that this is not true.

The evidence for the earlier pronunciation of *-ur, -une, -u(i)t*, and final *-u* shall be stated rather more fully than for the points hitherto dealt with. It will be seen that this vowel in unaccented syllables is written *i* or *e*.

15th Century

-ur(e): *to paster, moister* 'moisture,' *venter* 'venture.'

-ut: *savecondyte, condytte, byskitt, mynite* (a note).

-u-: repetation 'reputation'

16th Century

-ur: unscripterlye (Bishop Latimer), *jointer* 'jointure' (Earl of Bath, and Roper's *Life of More*), 'mannering the ground' (Wilson's *Arte of Rhetorique*), where it is evident that the word was accented on the first syllable, as it still is in provincial dialects.

-un: *comyne* 'to commune,' mysseforten.

-u+ous: *verteous, sumptious, tortious* 'tortuous (Spenser).

-u: *nevys* 'nephews,' *moniment* 'monument' (Spenser).

17th Century

-ur : Verney Memoirs: *ventarous, jointer, venter, futir, futer* 'future.' Cooper (1685) says that *picture* is pronounced like *pick't her.*

-une : Verneys have *fortin* 'fortune,' *fourtin, fortine, misfortin, unfortinate.*

-u- : Verneys: *miracilous, continial.*

-u : *valy* vb. 'value' (Lady Sussex), *neuie* (Mrs. Basire).

18th Century

-une : *fortin* (said by Tony Lumpkin in *She Stoops to Conquer*).

-ure : Wentworth Papers: *creators, torter* 'torture,' etc. Jones (1701) says *-ure* is 'sounded like *-er*' in *adventure, cincture,* etc.

-u- : Lady Wentworth has *vertious, vallyed* 'valued,' *yousyal* 'usual.'

What would be thought of one who nowadays should speak of 'leavin a *fortin* to his nevy'? And yet that was the manner of speech of scholars as well as of great ladies in the politest periods of our history.

The ending -on

The habit of pronouncing unaccented *-on* as *-in* (written *-in, -yn,* or *-en*) is traceable during the 15th, and the *-en, -in* spellings become increasingly common in the following centuries. Some words such as *pidgeon* are still commonly pronounced with *-in,* and old people alive till quite recently, pronounced *surgeon, luncheon, cushion* in this way.

Sesyn 'season,' *Devynshyre, reken* 'reckon,' etc., are found in the 15th century, and *reasyn* 'reason,' *burgine* 'to bud,' *mutten, Marten* College (Merton), *conmyshin* 'commission,' *dungen, to reckin, prysyn* 'prison,' *posshene* 'portion' in the 16th. The Verney Memoirs have *surgin* 'surgeon,' *ribins* 'ribbons,' *fashing* 'fashion.' In the 18th century Jones indicates what is certainly the same pronunciation, which he calls 'the sound of *e*,' in *contagion, cushion, fashion, luncheon, truncheon.* Peter Wentworth writes *beckinged,* Lady Wentworth *Compten*; Baker (1724) writes *sturgin, dungin* 'dungeon,' *punchin* 'puncheon,' *flaggin* 'flagon,' *cooshin.*

-ac- *in unaccented syllables*

15th Century

stomechere, almyneke.

17th Century

Verney Memoirs: *stomichers, obsticle, carictor.*

18th Century

Baker (1724): *stomick, Isic.*

-a- *in unaccented syllables before various consonants*

15th Century

-ave : Seynt *Oleffes* (Olave).

-age- (-enge-): *messynger,* etc. (very frequent).

16th Century

-ase : *purchisse* (Gabriel Harvey).

-an- : *compeny.*

17th Century

-an- : *compiny* (Lady Sussex).

-as- : Sir *Tomis* Chike (Lady Sussex).

-a- : *contrydicting.*

18th Century

-ave : *St. Olive* (Jones, 1701).

-ate : *pryvit* (Lady Wentworth); *chockolet* (Lady Strafford).

-o-, -ow-, *in unaccented syllables*

15th Century

dysabey; abedyensses; sa mych 'so much'; *bysshape.*

16th Century

men a warre 'men-of-war' (Lord Berners); *Justus a pesse; seaven a clocke; ten a clocke; apinions.*

17th Century

soriful (Lady Sussex); *acomidasyon* (ibid.); *abay* (Mrs. Basire); *fagets* 'faggots' (Lady Hobart); *Pigit* 'Piggott' (Lady Gardiner).

The examples are enough to show that in earlier times good speakers altered the vowel sounds in unaccented syllables pretty much as we do to-day, and that in some cases they went a good deal further than we do.

We see that the older pronunciation is that which makes a difference in unaccented syllables, and not that which attempts to produce a full vowel sound as it would occur in an accented syllable.

At the present time, the gospel of unchanged vowels in unaccented syllables is preached in some quarters. It is certainly a matter of taste whether English has a nobler and more beautiful sound when pronounced in a manner which is different from traditional habit and natural tendency. No one can complain if some people hold that it is so. But those who deliberately introduce this form of artificiality into their speech should frankly declare that they do this because they like it, and should not attempt to justify the practice by pretending that they are 'restoring' the primitive character of the language. It must be admitted that such so-called 'restorations' are, to use Dr. Johnson's phrase, 'capricious innovations,' which would have appeared as ludicrous in the successive ages of Caxton, Shakespeare, Dryden, and Pope as, to many, they appear to-day; indeed, they would have been even less tolerable then, because less familiar; the movement for 'reform' had not begun, so far as our evidence goes. If it existed at all, it must have ap-

parently been confined to a small number of pedants and cranks whose influence was *nil*.

The general lesson we learn from a careful study of the English of the past is that standards of propriety in speech are for ever shifting, that there is no *absolute* 'right' and 'wrong,' and that many dogmatic statements on this subject have no sounder authority than belongs to individual whim.

(*Concluded.*)

Reviews of Books

The Control of Life. By J. ARTHUR THOMSON, M.A., LL.D. (Andrew Melrose, *7s. 6d.*)

The purpose of this book is to vindicate a particularly modern thesis, namely, that Science is for life. It is written in an attractive way by one who is not only a professional biologist, but an acknowledged master of popular exposition. On the subject of science and life several books have appeared of late; this one differs from them in dealing with the subject mainly from a biological point of view.

From the informality of its diction, its occasional moralising, a repetition or two, and the nature of the few slips that have been made, it is not hard to gather that some of it at least is the spoken word, and one need not be a Sherlock Holmes to deduce further that the audience addressed consisted of men engaged in religious, educational, or social work, not specially trained in science, but evidently with wide interests, up against some of the problems of life and anxious to know what biological science has to contribute to their solution. These sentences may serve to give a general idea of the book and of the class of readers to whom primarily it should appeal.

Science is for life. Professor Thomson does not wish to argue that life is the only end of science, or that science and more science are the only things man needs in life. His point—and it is an old point, but a fresh and up-to-date exposition of it is both necessary and interesting—is that mankind may reach a new freedom and attain to greater heights by bringing more brains, as well as more good-will, to bear on the relief of his estate and the enlargement of everyday life; that an application of science to *every* practical problem will rid him of many hindrances that slow his progress towards the fuller realisation of his ideals.

Is there a single practical branch of human thought or knowledge that has been left untouched by the progress of science? Many would prefer to avoid answering this question, but the answer "No" must be given. It cannot be avoided. The physical conditions which control our existence must necessarily be more fundamental than the æsthetic, the moral, or the intellectual. Our religion, philosophy, and political systems must be in harmony and alliance with our science if they are to be a help and a happiness to man in his ascent.

The book is expository. Professor Thomson gives some examples of discoveries in the inorganic world that have given civilised people control over their environment: the X-rays which locate the pearl in the unopened oyster or the bullet buried in the bone; the ether which carries messages so that man from afar hears the cry of ships in distress upon the sea; the falls at Niagara which drive mills and illumine cities hundreds of miles away; the fertilisers made partly out of thin air; the preventive measures adopted in the conquest of plague and pestilence.

In the realm of organisms Professor Thomson cites the following examples: "The science of heredity has supplied levers which can be used with great practical effect in regard to cereals, root-crops, and fruits, cattle, sheep, and poultry. To the interesting problems of forestry, which are of great importance from the occupational as well as from the economic side, the methods of genetics and bionomics have only begun to be applied. It has been shown how 'waste places' like sandy heaths, pit-heads, and salt marshes, may be made profitable. . . . It may be that some discovery in bio-chemistry will change the whole economic problem of food-supply."

In a further chapter the author proceeds to illustrate other aspects of the rapidly growing biological control of life. He mentions the conquest of many microbic or parasitic diseases such as malaria; the development of serum therapeutics, which is so important in connection with diphtheria and tetanus; and the utilisation of the secretions of the ductless glands of other organisms to supplement deficiencies in our own.

The four subsequent chapters discuss the way in which biological science can help in questions of heredity, health, and nurture, and deal in some detail with such subjects as our natural inheritance, recent advances in the study of heredity, nature, and nurture, individually acquired modifications and their transmissibility, the biology of health and the individual life-cycle. The treatment of these subjects is exceedingly good considering the author's limits of space. A man who expects a stop-press *Encyclopædia Britannica* within the covers of a book of 275 pages will complain of scrappiness of treatment, but the sensible reader will see that each chapter is a useful introduction to a subject which may be pursued further in the larger treatises where the rate of exposition is less breathless.

Professor Thomson next deals with problems of population and social ideals, such as eugenics and eutopias, from a biological point of view. On these subjects he writes optimistically, (he believes in the idea of progress), but very wisely he realises and declares that, although the biological teaching is the first word on them, it is not by any means the last. He does not advocate, for example, killing off the unfit, or practising the ruthless methods of those who like to regard men as brutes.

"Our kindly social sentiment and sense of solidarity is a sign of progress; every right-minded person hopes for more. And yet we help the sickly, the diseased, the thriftless, the feckless, and we must go on helping them. . . . We have thrown off the yoke of Natural Selection. And yet, if we persist in sheltering inferiority from the

penalties of inferiority, if we persist in not allowing superiority to reap anything like the full rewards of superiority, we are assuredly making for trouble. So some brave men would return to Lycurgan methods, to Plato's purgation of the State. But we cannot do this wisely, we have not knowledge enough; and we would not if we could. . . . We must judge physical operations not only in themselves, but in the light of biological ideals, and biological operations in the light of the psychological, and psychological changes in the light of the social, which includes the ethical."

Readers who like this book might read along with it other books on the bearing of material progress upon life. Among such are Sir Richard Gregory's *Discovery* (Macmillan), Professor Soddy's *Science and Life* (John Murray), and *Science and the Nation*, published by the Cambridge University Press.

The Tale of Terror: A Study of the Gothic Romance. By EDITH BIRKHEAD, M.A. (Constable & Co., Ltd., 15*s*.)

The emotion of fear is based on one of man's primary instincts, that of self-preservation. It is little wonder, then, that from the earliest known days of their art story-tellers have concentrated their efforts on exciting this emotion in their audience, and there are few novels written to-day which do not somewhere or other in their pages inspire us with suspense or fear in order to add zest and colour to their plots. But it is a rare fashion in story-telling when the whole of the plot is subordinated to arousing fear, and every other emotion is used merely to obtain this single result. Such a fashion came into full swing in the second half of the eighteenth century, and it is with this fashion that Miss Birkhead deals in the most exhaustive and scholarly treatise yet devoted to the subject.

The great mass of literature which this fashion brought to birth is now dead. Had it not ceased in later years to produce those "sensations of terror" so dear to the hearts of eighteenth-century readers, there might have been a chance for its continued existence as a classic literature of decadence. Its only interest to the mind of the twentieth century lies in its psychological significance, and we feel that this has not been sufficiently examined by Miss Birkhead. It is very noticeable that, as the first impulse of the Renaissance in England began to lose power, a greater earnestness, gradually deepening into gloom, took the place of the gaiety and *joie de vivre* that had flooded life and thought in the fifteenth and early sixteenth centuries. The earliest important literary echoes of this are to be found in Marlowe's tragedies and Shakespeare's tragedies and sonnets; depression deepens and terror increases in the drama of Webster, Beaumont and Fletcher, and Tourneur; the strengthened Puritanism of the Commonwealth becomes reflected in the cold, gloomy religiousness of Milton, and it survives the Restoration in the uncertain introspective poetry of John Donne and other writers. Eighteenth-century thought and literature, with its materialism, its common sense, and its dry wit, is a reaction to all this; but it is only a superficial reaction, and we can detect beneath it, in such phenomena as the "truly horrid novel" and its popular reception, the irresistible tendencies which were affecting and shaping our national mentality. The very fact that so many of these novels cultivate a supernatural terror seems to us to be an unconscious protest against the unspirituality of the age, to be an attempt to fill its place, as it were; while their romantic qualities cry out against its prosaicness. Moreover, in the dearth of adventure and war during the eighteenth century, the novel of terror created the needed diversion from humdrum contentment, and it had time to develop the impossibilities of its far-fetched romanticism before the nineteenth century arrived, with the rise of science and a popular mentality whose tastes were for a more realistic crystallisation of life in literature.

One of the most peculiar "signs of the times" was the cultivation of the mood of "melancholy." This has, we feel, never been sufficiently examined in connection with the Gothic romance and novel of terror, many of whose writers tell us in their prefaces that they wish to inspire us with feelings of "melancholy." Our belief is that it was a concomitant of the increasing earnestness and introspection, which we have mentioned, that began to appear in the late fifteenth century, and that its main origins lie in Burton's *Anatomy of Melancholy* (1621) and in Milton's *Il Penseroso* (1632). From then onwards we find increasing references amongst writers to the word which appears to have been descriptive of a mood of depression, usually experienced in loneliness—a somewhat artificially created "sweet sadness." By the middle of the eighteenth century nearly every poetaster tried his hand at an ode to Melancholy, or at verses which were designed to produce the effect of it. This is how Dr. Johnson's friend, Elizabeth Carter, apostrophises it:

> "Come, Melancholy, silent pow'r,
> Companion of my lonely hour,
> To sober thought confin'd!
> Thou sweetly sad ideal guest,
> In all thy soothing charms confest,
> Indulge my pensive mind."

Ogilvie addresses it in very similar notes, the poet Gray refers to it as a "pleasant sadness" in one of his letters, and his famous *Elegy in a Country Churchyard* (1750) is a typical though outstandingly good example of the *pathetic* and *sentimental* poetry of the later eighteenth century, other fairly well-known types of which may be found in Young's *Night Thoughts*, Blair's elegies, Bowles' *Sonnets*, certain of Burns' poems, and even as late as in the youthful Shelley's productions. Churchyards, rotting corpses, yew trees, the weirdness and solitude of moonlit wastes, are the invariable stage-scenery of these poems, which all aim at producing the sensation of *melancholy*.

The aims of the novelists of *terror* were generally identical with those of the *pathetic* poets. The methods of the novelists were various, and Miss Birkhead has been careful to distinguish the different schools. The earliest was that of the Gothic romance started by Horace Walpole in *The Castle of Otranto*, whose far-fetched supernaturalism

makes monotonous reading. Mrs. Radcliffe, chiefly known nowadays as the authoress of *The Romance of the Forest*, created the "novel of suspense," and showed a marked ability for descriptions of romantic scenery and for puzzling the reader as to the development of her plots. She gives the reader the impression of the existence of supernatural agencies in the background, but, somewhat to his disappointment, explains them away at the end of her tales as merely material agencies. Terror was brought to a much higher pitch in the novels of Lewis and Maturin. Both wrote conscious melodrama and never spared a scrap of gruesome detail, and both owe much to Continental, particularly German, literature; but *The Monk* and *Melmoth the Wanderer* move vividly and powerfully to their tragic ends, and never cease to hold the reader's interest. The Oriental tales of terror, whose vogue was started by Beckford's *Vathek*, and the Rosicrucian novel started by Godwin and dying a natural death in Shelley's youthful and hysterical romances, gave place to the new fashion set by Sir Walter Scott in *Thomas the Rhymer* and *The Lord of Ennerdale*.

Since the days of Scott, the tale of terror, though it has long ago ceased to be the fashionable *rage*, has been widely developed. In America Hawthorne and Poe confined themselves chiefly to the *supernatural* tale of terror. A vast number of writers in England contemporary to them produced tales of material as well as of supernatural terror. Amongst later novelists the pastmaster of terror is Stevenson, whose *Dr. Jekyll and Mr. Hyde* may be considered as ushering in the psychological novel and indicating its even greater terrorising possibilities than the supernatural one; Joseph Conrad has done some remarkable work on somewhat similar lines, while Hugh Walpole possesses a weird capacity of allowing a suspicion of supernaturalism to hover in the background of his romances.

A bibliography would have added value to Miss Birkhead's book, but the footnotes supply a wealth of references to the bye-ways of eighteenth-century literature.

E. L.

A Philosopher with Nature. By BENJAMIN KIDD. (Methuen & Co., Ltd., 6s.)

Those who have read *Social Evolution* and *The Science of Power* will always remember Benjamin Kidd as a man who brought the mind of a poet as well as that of a scientist to the study of sociology. He possessed the faculty of opening up vistas of new meaning behind the hard facts of everyday political and international life. To him all the world was a stage, and he portrayed its past, contemporary, and possible future evolution with a dramatic suggestiveness. Whether we agree or disagree with the ideas that he read into international history, we who have read his work will be grateful to his genius for stimulating the mind to fresh trains of thought on social and international tendencies.

In this book of collected studies we see a quieter side of his mind—that of a natural historian living and delighting in the animal life of the countryside. But here again we find the creative artist creeping into the rôle of the accurate scientific observer. In describing wild life in the Severn estuary, Kidd suggests a possible explanation of the southward migration of birds "before the food-supply fails them, and before they have any physical want known to us indicating a coming change in the conditions of life." He puts this down to "the deep emotional effect on all wild nature of the waning light in the declining year, and the uncontrollable instinct to follow the sinking sun begotten in those whose habits of life it affects"; and he goes on to show how "deep down in the psychology of peoples lies the corresponding primordial instinct of the waning day." He indicates the fact that dying men have begged to have their faces raised to the setting sun, that many of our houses are built to face the west and our great European cities have grown towards it, till the "west-end" has in most cases become the residence of fashion, and how the "emotional, adventurous, sanguine" races have trended westward till they have conquered the ocean and followed the sun "over the virgin continent of the New World."

In utterances such as this we have the key to the spirit that dominates this great little book. It is an undogmatic, questioning spirit, probing suggestively into questions of science and natural history which have yet to be solved. In particular it concerns itself with the problem of how far it is instinct and how far mental process that governs the actions of the animal kingdom. Since the time of Darwin a vast amount of literature has been devoted to this subject. But no scientist or philosopher has surrounded it with so beautiful and quiet a setting as one can find in these short essays—a setting in which wild bees drone, moor-hens skim across deserted waters, and the nightingale sings from the shadows of great trees; into which the shot of a gun or the clank of a railway train penetrate only to fade away again quickly and to remind us symbolically that man's civilisation is ephemeral and that "it is the things of nature alone which are eternal."

E. L.

Karma, and other Stories and Essays. By LAFCADIO HEARN. (George Harrap & Co., Ltd., 5s.)

These posthumously collected and republished stories and papers of the late Professor in English Literature at Tokyo University make rather disappointing reading, and they hardly do justice to his personality. A consciously adopted poetical prose, which is the medium that this well-known American literary critic has used in the two longest tales in this volume, "Karma" and "A Ghost," is an insidiously dangerous form of literary expression. The great Russian novelist Turgenev tried his hand at it, and, though we cannot say that he entirely failed, we can say quite certainly that the tales of this type which he wrote are not comparable with his other work; De Quincey came near to success in this direction in *The English Mail Coach*; Walt Whitman's *vers libre* attains to great heights of beauty, but often falls into bathos and bizarrerie; the effect of that modern mystic Rabin-

dranath Tagore's poetical prose is frequently quite lost in a plethora of words. The fact is that the essence of poetical expression is the quality of *suggestiveness*, while the essence of prose expression is the quality of *directness*. The combination of these two qualities is almost impossible, and the best writers sooner or later find themselves out of their depth in trying to maintain it. Artificiality sets in after the first few paragraphs, and personality is lost. It is for this reason that we fail to detect Hearn's personality in these tales. That is why they are not literature of the first water, for in great fiction we are invariably shown life through the medium of the writer's own personality.

In *Karma* we encounter the problem of whether a man should give the woman of his heart a full, written confession of the faults in his past life. However great the emotion that impels a writer to tell the story that centres round such a problem, it will never be fully conveyed to the reader unless his sympathy with the hero of the story is maintained. Our sympathy with the hero of *Karma* is not maintained, because his character and his emotions are enveloped in a mass of words. As for the angel of his dream, she is a sentimental prig who, a year after sending the man away from her as the result of reading his confession, suddenly arrives in the city of his exile and informs him that she will help him to bear his suffering, most of which seems to us to have been brought about by herself.

If de Maupassant had written on such a subject, he would have developed the priggishness of the woman's character with a conscious irony, and he would have ended by making the man turn the tables against her in refusing to have anything to do with her when she eventually turned up again to claim him. If Tchehov had treated it, he would have shown two human beings played upon by emotions too strong and subtle for them, and he would have ended on a note of pity for both of them, still wavering as to the future courses of their lives. Both writers would have dismissed the plot in a quarter of the space used by Hearn, and both would have inspired us with feelings of sympathy or pity for one or both of the characters.

I have purposely judged Hearn by high standards because there exists a considerable element of greatness in his somewhat uneven productions. He can touch a responsive chord in our hearts by the perfect expression of feelings that have come to so many of us. *A Ghost* is full of such human echoes, of which this passage is an example: "Oh! the first vague charm, the first sunny illusion of some fair city—when vistas of unknown streets all seem leading to the realisation of a hope you dare not even whisper; when even the shadows look beautiful, and strange façades appear to smile good omens through light of gold! And those first winning relations with men, while you are still a stranger, and only the better and the brighter side of their nature is turned to you! . . . All is yet a delightful, luminous indefiniteness —sensation of streets and of men—like some beautifully tinted photograph slightly out of focus. . . ."

Of the papers in this volume "The First Muezzin" contains an account well wrought from many sources of the origin of the Moslem Call to Prayer, and a prophetic note dominates the essay on "China and the Western World," which originally appeared in *The Atlantic Monthly* as far back as 1896. Both papers are written in clear and forceful prose.

E. L.

The Electric Furnace. By J. N. PRING, M.B.E., D.Sc. (Longmans, 32*s*.)

How amazingly large and detailed science has become in the last fifty years! Physics is but a very small branch of science, and electricity of physics, and here is a book of five hundred pages on the electric furnace, a small branch of electricity. The electric furnace, just that. And five hundred pages of close print with diagrams, photographs, index and the whole make-up of the modern scientific handbook. What amazing people these scientific authors must be! How do they manage it? Do they themselves know everything in the books they write? What excellent memories they must have!

This book is the latest volume of the series of monographs on industrial chemistry that are being edited by Sir Edward Thorpe. It is a general technical discussion of the position and prospects of high-temperature industrial chemistry. The author has many qualifications for writing this book. For years he has been engaged in research in electro-chemistry, he has read widely, he has visited many of the chief electro-chemical centres of Europe and America, and he has a good eye for the economics of a commercial undertaking. Also, like many of the scientific book-writers of late, he has had an exceedingly valuable war experience with the Ministry of Munitions. The book is written for technical readers only. Such like the information to be fresh, up-to-date, relevant and as accurate as possible. This book, therefore, I judge, will be useful to them and is well worthy of its inclusion in Sir Edward Thorpe's series.

The electric furnace is connected in the minds of most of us with the name of Moissan and the production of artificial diamonds. We have not heard so much about these diamonds of late, and without doubt they are not yet sufficiently numerous and large to disturb the pleasant connection existing at present between Kimberley, Park Lane, and the general public. In this book their real place in the category of useful things is sufficiently indicated by their not being mentioned at all. No, the electric furnace's real value is in making less spectacular things like steel, carbides, and nitric acid.

The electric current has been used in manufacturing processes in two ways. There is its chemical or electrolytic action, which is the principle on which the large-scale manufacture of such metals as aluminium and sodium, and the refining of metals like zinc and copper, depend.

Secondly, simply as a producer of heat it has led to the attainment of temperatures higher than those attained by other methods, and this has naturally opened up an important field of chemistry and, as it has happened, of industrial chemistry, for many of the products isolated for the first time in the electric furnace, like artificial graphite,

the carbides, and the highly refractory metals in a compact form, have received an important commercial application. Again, in spite of the cost, there is a progressive tendency for the extension of electrical methods of heating to chemical processes at all ranges of temperature. In the manufacture of certain classes of steel, of iron and of iron alloys, the electric furnace is supplementing, and in some cases supplanting, the older "flame" furnace. "Electric" heat can always be more conveniently applied and controlled. It can raise the material being treated to higher temperatures and keep it freer from contamination by gases, etc., than the heat generated in the usual way, and for high-grade steels, where quality is of the first importance, the electric furnace seems to have a field of its own. Other notable substances manufactured in the electric furnace are calcium carbide, carborundum and the important compounds of nitrogen, ammonia and nitric acid, made from the atmosphere, which are the bases of many fertilisers and of all modern explosives.

Dr. Pring puts the whole matter before his readers. In addition to a description of the great manufacturing processes in which electric furnaces are used, he deals with such diverse subjects as current supply, transformers, the measurement of high temperatures, heat losses through furnace walls, water-power development, and even the design of furnace terminals. The illustrations, diagrams, and tables, with which the book is plentifully supplied, all help to make the book more valuable. Alas, also, they make its price high. Is one a churl to expect a good book and then to object to its price? A publisher, there can be no doubt, knows much more about cost of production than a reviewer; he must also know, from the results of the sales of other books, how many people can afford to pay the apparently high price for them, so fixing the price is clearly his business. Yet thirty-two shillings is a lot of money whatever it be spent upon. A monograph is a book to be bought, not merely to be consulted, and a high price prevents its purchase by many readers who happen not to be made of money. The majority of scientific textbooks still follow in the old rut of dry explanation of elementary matter, "page one stuff," in which no one, not excepting the author, takes the least interest. This book contains much matter likely to be found in books intending readers already possess. The omission of this would make the book less comprehensive, less complete, but not in the least less valuable, and might have made it possible for the publisher to lower its cost a little, perhaps even to the humble sovereign.

A. S. R.

Books Received

(Books mentioned in this column may or may not be reviewed in this number, or in a later number.)

ARCHÆOLOGY

Balabish: The 37th Memoir of the Egypt Exploration Society. By G. A. WAINWRIGHT. (George Allen & Unwin, 42*s.*)

LITERARY CRITICISM

Modern English Drama: An Outline. By PATRICK KIRWAN. (National Home-Reading Union, 1*s.*)

MISCELLANEOUS

The Fellowship of Learning. Presidential Address delivered by SIR F. G. KENYON, K.C.B., at the Annual General Meeting of the British Academy, July 6, 1921. (Published for the British Academy by Humphrey Milford, Oxford University Press, 1*s.* 6*d.*)

Travels of a Consular Officer in North-West China. By ERIC TEICHMANN, C.I.E. (Cambridge University Press, 25*s.*)

The Wit of the Wild. By ERNEST INGERSOLL. (George Routledge & Sons, Ltd., 6*s.*)

Fasting and Man's Correct Diet. By R. B. PEARSON. (Published by the Author, Chicago, U.S.A.)

PSYCHOLOGY

Seven Ages of Childhood. By ELLA LYMAN CABOT. (Kegan Paul, Trench, Trübner & Co., Ltd., 12*s.* 6*d.*)

The Care of the Adolescent Girl. By PHYLLIS BLANCHARD, Ph.D. With Prefaces by DR. MARY SCHARLIEB and PROF. G. STANLEY HALL. (Kegan Paul, Trench, Trübner & Co., Ltd., 7*s.* 6*d.*)

Taboo and Genetics, A Study of the Biological, Sociological and Psychological Foundations of the Family. By M. M. KNIGHT, Ph.D., IVER LOWTHER PETERS, Ph.D., and PHYLLIS BLANCHARD, Ph.D. (Kegan Paul, Trench, Trübner & Co., Ltd., 10*s.* 6*d.*)

SCIENCE

Terrestrial Magnetism. British (Terra Nova) Antarctic Expedition, 1910–1913. By CHARLES CHREE, M.A., Sc.D., LL.D., F.R.S. (Harrison & Sons, Ltd.)

What is Science? By NORMAN CAMPBELL, Sc.D., F.Inst.P. (Methuen & Co., Ltd., 5*s.*)

Early Science in Oxford. Part I, Chemistry. By R. T. GUNTHER. (Humphrey Milford, Oxford University Press, 10*s.* 6*d.*)

Relativity and the Universe. By DR. HARRY SCHMIDT. Authorised translation by KARL WICHMANN, M.A., Ph.D. (Methuen & Co., Ltd., 5*s.*)

The Mechanism of Life. By JAMES JOHNSTONE, D.Sc. (Edwin Arnold, 15*s.*)

The Origin and Evolution of the Human Race. By ALBERT CHURCHWARD, M.D. (George Allen & Unwin, 45*s.*)

The Advancement of Science, 1921. Addresses delivered at the 89th Annual Meeting of the British Association for the Advancement of Science, Edinburgh, September 1921. (John Murray, 6*s.*)

Aggregation and Flow of Solids : Being the records of an experimental study of the Micro-structure and Physical Properties of Solids in various states of Aggregation, 1900–1921. By SIR GEORGE BEILBY, F.R.S. (Macmillan & Co., Ltd., 20s.)

The Physical Properties of Colloidal Solutions. By E. F. BURTON, B.A., Ph.D. (Longmans, Green & Co. Second Edition, 12s. 6d.)

Biological Chemistry. By PROF. H. E. ROAF, M.D., D.Sc., etc. (Methuen & Co., Ltd., 10s. 6d.)

Miscellanea

To the Editor of DISCOVERY

DEAR SIR,

In his letter to you last month Mr. Williams asked where the elements coronium and nebulium found in the sun figure in the list of chemical elements. The present arrangement of elements in the periodic system suggests that all light elements heavier than hydrogen have been discovered, and if nebulium and coronium prove to be genuine new elements, not lighter than hydrogen, then this arrangement is less perfect than it appears to be at present. Two things, however, should not be lost sight of: (1) as neither coronium nor nebulium are found on the earth, knowledge of them is scanty; and (2) one or both of these elements may be lighter than hydrogen or may be "isotopes" of hydrogen, helium, or some light element. If either of the alternatives of (2) proves correct, the difficulty Mr. Williams mentioned is removed. It may be mentioned that "isotopes" both of hydrogen and helium exist. Each has an atomic weight of three. They are, of course, distinctly different gases.

OXFORD, A. S. RUSSELL.
September 10, 1921.

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In our September issue we referred to a note on the "Tudor-Hart Theory of Colour" that had appeared in the July *Psyche* (the new form of the *Psychic Research Quarterly*). It touched on ground where the account of "Revolutionary Movements in Modern Painting" in our August issue made a halt, and we quote a portion of it here for its interesting suggestiveness: "*The* analogy (*between Colour and Sound*), which has appealed to many students ever since the days of Newton, depends, first, on a precise standardisation of colour . . . and, second, on the correct correlation of the variables which determine sound and colour respectively. Each can vary in three ways: Sound in respect to Pitch, Loudness, and Quality, and Colour with regard to Luminosity (brightness), Saturation (purity), and Hue (colour, e.g. red, blue, green, yellow, etc.).

"Mr. Tudor-Hart finds, as a result of laborious researches extending over many years, that if these variables are once rightly related to one another (luminosity to pitch, saturation to loudness, and hue to quality), it is possible to transpose from musical harmony into colour harmony without change. That is to say, the colour analogue of a harmonious musical chord will also be harmonious and *vice versa*. Moreover, which is even more remarkable perhaps, the emotional effects produced by the colour analogue will be equivalent to those produced by the musical chord itself.

"This discovery, into the ramifications of which it is not possible to enter here, opens the way to a new treatment of colour problems. It makes possible the production of a standardised colour notation whereby all who are concerned with the handling of colour may refer unambiguously to just that hue, saturation, and luminosity which they have in mind. The value of such an advance for practical work can hardly be over-emphasised, for the colourist will at last be as favourably placed as the musician with regard to technique and the manipulation of his medium; and the vague, even when correct, intuitions of artists will be capable of fixation in determinate form, in the same fashion as are the inspirations of musical composers.

"This ideal may still be remote, but Mr. Tudor-Hart's work has unquestionably done more than that of any contemporary student to indicate how it may be attained."

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A novelist of the Jack London type should find a wealth of "copy" at the small port of Tromsö, which lies on one of the northerly fiords of Norway. From a description of it that a member of the Oxford University Expedition to Spitsbergen, which has now returned to this country, gave us the other day, it resembles nothing so much as Dawson City during the days of the Klondyke goldrush. Tromsö nowadays acts as the base for nearly every "coal" venture in Spitsbergen. Speculators, mining engineers, explorers, and "hangers-on" of every European nationality jostle each other in its streets, Danes and Scotchmen are very prevalent, but most conspicuous are the inevitable Russian Jews. Some of the latter make hundreds of thousands of pounds over buying and selling coal claims, and appear to spend a weird nomadic existence between the wilds of Spitsbergen and the pleasures of Paris. Everyone is suspicious of everyone else and, for the whole of the short period that our friend spent there, he was pestered with questions by people who could not believe that he was proceeding to Spitsbergen merely for scientific research! Before the end of the year we hope to publish an illustrated summary of the work carried out by the expedition.

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We regret that news of the Mount Everest Expedition sent recently to *The Times* by Col. Howard Bury, who is in command, is not hopeful. It has been found that an ascent from the northern or north-western side is not practicable, and the southern side seems equally hopeless because of the high precipices which flank it. The expedition has consequently moved its base to the eastern side, and pitched camp at a spot in the Arun valley 12,300 feet high. On August 2 the exploration of the eastern approaches was begun, but, as the last news was dispatched two days later, it is not yet known with what success. Nine thousand miles of new country have already been mapped by the party.